S ON THE MANAGEMENT

HE COMMONER INFECTIONS

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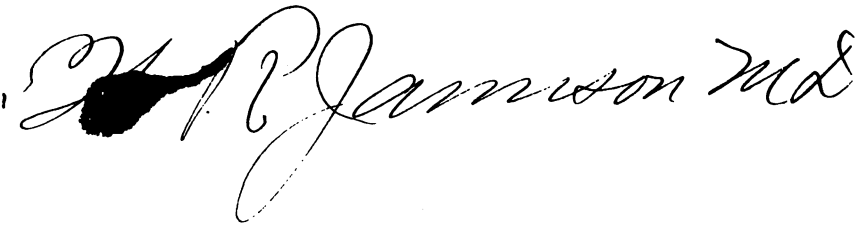

HINTS ON THE MANAGEMENT

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COMMONER INFECTIONS

BY

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PREFACE

In the midst of arduous daily duties the busy practitioner may be ofttimes but little inclined to consider the precise value of those details of treatment which are compressed within a few sentences in the text-books usually available. For such an one, as well as for the student who, about to enter on the practice of medicine, has not yet appreciated the fact that the ultimate goal of all his endeavours is the individual treatment of patients, it is hoped that the following pages will be found to be of service.

In order to limit the subjects for consideration, those diseases which are not endemic in this country are practically excluded, while those in which the practitioner is more especially concerned only with their diagnosis are but briefly outlined.

It has been the endeavour of the writer to present a résumé of the principles of treatment to be observed in the management of those commonly occurring infections or intoxications

which are due to the direct or indirect action of micro-organisms.

The writer wishes to acknowledge his indebtedness to Professor J. Dreschfeld and Professor I. Walker Hall for numerous practical suggestions, and to the latter also for valuable assistance in many ways.

R. W. MARSDEN.

3, ST. PETER'S SQUARE,
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CONTENTS

CHAPTER I

GENERAL MEASURES

PAGE

FEVER - - - - - - - 1

(*a*) METHODS OF APPLYING COLD WATER TO THE SKIN - - - - - - 9

(*b*) BED - - - - - - 14

(*c*) VENTILATION, CLEANLINESS, WARMTH - - 16

(*d*) FEEDING - - - - - 19

(*e*) DRUGS AND STIMULANTS - - 24

CHAPTER II

SPECIFIC INFECTIONS

1. INVASION OF THE BODY BY SEPTIC MICRO-ORGANISMS 30
2. ERYSIPELAS - - - - - - 37
3. RHEUMATIC FEVER - - - - - 39
4. CHOREA - - - - - - 42
5. MALIGNANT ENDOCARDITIS - - - 43
6. PNEUMONIA - - - - - - 44
7. EPIDEMIC CEREBRO-SPINAL MENINGITIS - - 50
8. EPIDEMIC INFLUENZA - - - - 53
9. CORYZA - - - - - - 55
10. MEASLES - - - - - - 57
11. RÖTHELN - - - - - - 64
12. PERTUSSIS (WHOOPING-COUGH) - - - 65
13. TONSILLITIS - - - - - 69
14. SCARLET FEVER - - - - - 70

PAGE

15. DIPHTHERIA - - - - - - 74
16. TETANUS - - - - - - - 84
17. ENTERIC FEVER - - - - - - 85
18. PARATYPHOID FEVER - - - - 93
19. DYSENTERY - - - - - - - 93
20. SUMMER DIARRHŒA - - - - 96
21. ACUTE ENTERITIS - - - - - 99
22. PTOMAINE-POISONING - - - - 106
23. SMALL-POX - - - - - - - 107
24. VACCINIA - - - - - - - 111
25. VARICELLA - - - - - - - 114
26. MUMPS, OR INFECTIVE PAROTITIS - - - 114
27. TYPHUS FEVER - - - - - - 115

APPENDICES

I. ISOLATION - - - - - - - 118
II. DISINFECTION - - - - - - 126

HINTS ON THE MANAGEMENT

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CHAPTER I

GENERAL MEASURES

In considering the results of the invasion of the body by micro-organisms or their products, the commonest, even if not the most important, manifestation is an alteration of the body temperature. As a general rule a varying degree of pyrexia occurs, upon the management of which the progress of the disease will often materially depend.

FEVER.

From the practical point of view it makes no difference to the methods of treatment whether the increased temperature of the body is due to the thermotaxic mechanism being so altered as to

regulate the balance at a higher level than the normal, or whether it is due chiefly to a diminished loss of heat as opposed to increased production. The important point is to recognise that the febrile disturbance is the evidence of the reaction of the tissues generally to some intrusion interfering with their metabolism, and that this reaction in itself leads to tissue waste. It is thus frequently necessary to actively counteract the effects of the pyrexia, particularly in such diseases as typhoid fever, where the length of the period of its duration and the consequent tissue degeneration cannot be determined, or in such affections as erysipelas, scarlet fever, etc., where its degree is occasionally excessive.

In this connection it cannot be too early nor too strongly remarked that the routine use of antipyretic drugs for this purpose only is wrong in principle. Certain exceptions must, however, here be stated—viz., the use of sodium salicylate or its congeners in rheumatic fever and quinine in malaria. These drugs apparently have a specific action in these conditions, but their value herein does not at all detract from the general statement previously made.

It has already been mentioned that a continued high temperature leads to degeneration and waste of the tissues generally, but at the same time it

must not be forgotten that in this respect the toxæmia or the microbic invasion usually exerts a decidedly more baneful influence. An ideal treatment will aim, therefore, to attack both conditions, while if a choice is to be made, it will, as a rule, be found advisable to make the elimination of the bacteria or their toxins the primary consideration.

Speaking generally, the antipyretic drugs have not been found to possess any special virtue in aiding the destruction of the micro-organism or the excretion of its toxins. On the contrary, these drugs are cardiac depressants in varying degrees, and their action might be more correctly summarized by stating that they aid in bringing about an increased loss of heat, which is, however, purchased at the price of an adverse influence on the tissues generally, and more especially on the circulation, whose integrity is necessary for the adequate nutrition and perfect condition of those tissues.

From practical experience it appears that direct withdrawal of heat from the skin without the agency of drugs gives the most satisfactory results. Such withdrawal exerts in suitable cases a beneficial influence on the course of the disease, and sustains the body generally in its contest with the offending micro-organism or toxins. Water

is the medium chiefly used, and the methods of its application will be considered later.

The repeated abstraction of heat from the skin by means of cold applications, together with the coincident massage and rubbing, maintains the supple and healthy condition of such skin during prolonged pyrexia in a manner which must be seen to be adequately appreciated.

It can be stated without fear of contradiction that many practitioners do not give to the skin that attention which its importance deserves. Its examination may serve as a visible index of the condition of the tissues generally, whilst its maintenance in the healthiest state possible materially influences its excretory power, and reflexly produces a favourable effect on the internal organs. For these reasons the hygiene of the skin demands more consideration than it usually obtains, and in this connection hydrotherapeutic manipulations, with massage, should be more generally practised.

Abstraction of heat by applications of cold not only maintains the skin in a healthier condition but also improves the tone of the vascular system, and thus favourably affects the general circulation. Such applications are followed, as a rule, by an increased elimination of toxins, a loss of stupor, and an increased disposition to natural sleep, with a

consequent improvement in the tissues generally, which is of material aid to the body in the contest which is taking place. The benefits received are so patent that in febrile states, for which cold applications are not contra-indicated, there can be no doubt that their trial on one occasion is sufficient to guarantee their continuance, even in the face of frequent difficulties or objections.

Unfortunately, the febrile state is not in itself an indication for hydrotherapeutic treatment, since under certain conditions the use of cold is positively harmful. It is necessary, therefore, to consider the contra-indications.

Contra-indications.

These may be tabulated as follows :

1. *Collapse.*—The application of cold to the skin must be looked upon as a violent stimulant, the violence of which depends upon the degree of cold used, the extent of skin dealt with, the length of time the application is continued, and the condition, more especially as regards the heart, of the individual patient. Its value undoubtedly lies not merely in the local abstraction of heat, but also in the circulatory alteration, which produces a flushing of internal organs and an improvement of their blood-supply. To withstand such extensive changes a certain reserve of cardiac force

and vascular tone are necessary. In default of these, the cold would but overtax the heart too much, the consequences being probably immediately disastrous.

This factor—viz., the condition of the heart and circulation—requires careful consideration in every case, and readily explains the objection to cold baths when the pyrexia is associated with complications such as peritonitis, hæmorrhage, etc. At the same time, it illustrates the impossibility of laying down absolute laws for each disease. In almost any acute infection the toxæmia may be so severe that further embarrassment of the circulation may bring the vital mechanism to a standstill, and there is probably no decision in the range of medicine which more explicitly demands a 'nearness of the nous' and a clearness of perception of all the necessary factors than the one we are now considering.

The question again comes forward even at different stages of the same attack in an individual, as well as under varying conditions of severity of the same disease. Take, for instance, a case of typhus fever. If, in an attack of moderate severity, before evidence of cardiac debility is available, cold baths are used, the patient may experience nothing but benefit; but in more severe attacks, or in later stages, it is

probable that such procedures may be effective means in determining an attack of pneumonia.

2. *Obstructed Respiration.*—The application of cold to the skin causes an immediate spasm of the inspiratory muscles, so that the presence of such a condition as *stridor* is an evident contra-indication.

3. *Certain Febrile Diseases,* more especially those usually associated with a catarrhal state of the respiratory mucous membrane, are injuriously affected by the sudden cooling of the skin. In such diseases as measles, pertussis, and coryza, instead of deriving benefit from the cold applications, the patient is more likely to succumb to a consequent attack of pneumonia. It would almost seem as though, given a catarrhal state of the mucous membrane of the respiratory tract, the production of an acute congestion reflexly by cooling the skin either renders the parts still further vulnerable, or permits micro-organisms to become active which had till then remained harmless. It is interesting to note that where the catarrhal condition of the lungs is secondary, and possibly largely toxæmic in origin, or dependent on circulatory changes, as in typhoid fever, the increased elimination of toxins and the improved condition of the heart are also accompanied by an improvement in the bronchitic signs.

In broncho-pneumonia the same considerations apply, active depletion of heat by extensive cold applications being usually unnecessary, and even positively harmful. Under the conditions specified, therefore, the use of cold packs or cold baths should be reserved to combat grave hyperpyrexia.

4. *Certain Complications*, such as hæmorrhage from the bowels in typhoid fever, are evidently a contra-indication, since the resulting action would be to increase the severity of the complication.

Again, the acute pyrexia occasionally associated with the onset of acute nephritis in scarlet fever contra-indicates the application of cold to the skin. The connection between the kidneys and the skin is so intimate that the effect might only be to still further embarrass the circulation in the kidneys.

5. *Individual Predispositions* must always be considered, and, in general, it may be said that where the application of cold gives rise to marked shivering or is not followed by the evidence of a beneficial reaction and a feeling of comfort and improvement, its continuance is contra-indicated.

Undoubtedly the most effective means of reducing the body temperature is by the use of baths. The temperature of the bath and the length of the immersion must be dependent upon the age and constitution of the patient, remembering that robust, stout individuals tolerate them

best, whilst great care is needed in dealing with infants and old people.

Contra-indications to Cold Baths, or Extensive and Marked Cooling of the Skin.

1. **Collapse.***
2. **Stridor.**
3. **Primary catarrhal conditions of the bronchial mucous membrane.**
4. **The presence of hæmorrhage, peritonitis, nephritis.**
5. **The production of marked shivering and no beneficial reaction.**
6. **Infancy and old age.**

To the above may also be added :

7. **The presence of perspiration or a feeling of chilliness.**

(*a*) Methods of Applying Cold Water to the Skin.

Currie's original method was to pour one or two bucketfuls of cold water periodically over the patient. A pleasanter, and in most cases prob-

* In all conditions accompanied by collapse the value of subcutaneous, rectal, and even intravenous, injections of warm saline solution (1 drachm of sodium chloride to the pint) must not be lost sight of.

ably more beneficial and safer method, is the immersion of the patient in an ordinary bath.

The temperature of the bath may vary from 70° to 85° F., and in young children repeated baths at even 90° F. not only give very satisfactory results, but from the absence of any shock to the system are frequently readily tolerated, and are decidedly less dangerous than when baths at lower temperatures are employed. After a few immersions, the juveniles not infrequently learn to appreciate the comfort apparently following these tepid baths, and may cease to object to their use.

The patient is allowed to remain in the bath for fifteen to twenty minutes, unless shivering or blueness of the lips occur before the lapse of that period, the limbs being rubbed by the attendant or nurse throughout the process. During the bath the attendant or nurse should carefully note the condition of the pulse. As the result of immersion, a diminution in calibre with a loss of the full dicrotic character is to be expected; but the reduction to a pulse of very small dimensions is an indication for terminating the immersion immediately, and should suggest the consideration of the necessity for the administration of stimulants.

After the bath the patient is very roughly and rapidly dried, then wrapped in a blanket, hot

bottles applied or stimulants given—if these should appear to be indicated—and as soon as the patient seems comfortable, suitable nourishment should be administered, since it is remarkable with what regularity sleep is induced, the introduction of this method of treatment, as, for instance, in typhoid fever, almost dispensing with the use of hypnotic drugs.

At the temperatures specified the baths might be more correctly described as tepid, but it must not be imagined that on that account they are devoid of effect. With complete immersion as practised in bathing, a difference of 20° F. between the temperature of the body and that of the water acts as a very efficient antipyretic, and by the mildness of its action overcomes the widespread antipathy to the more heroic measures when colder water is used. There is less shock, but the length of time of immersion is longer.

With adults, especially those who are robust, and show no tendency to cardiac debility as the result of their illness, the temperature of the water may be reduced with impunity.

It is important to remember that, so long as hydrotherapeutic treatment is indicated, no matter what method is adopted, the applications must be persistently repeated at stated intervals, viz., every four or six hours—until the required effects are

obtained. Spasmodic bathing, or even sponging and packing, are only of value for very temporary conditions. Their repetition must be insisted on so long as the indications persist.

The use of baths as antipyretic measures in adults is very little resorted to in private houses, owing to the absence of the supposed special conditions required—*e.g.*, portable bath, stretcher, attendants, etc. It is, however, very probable that during the early stages of such a disease as typhoid fever, provided the patient can with little exertion himself reach the bath, the benefits received will outweigh any added risks. But there is no need to resort to such a procedure. With a large mackintosh to protect the under sheet and mattress, the body may be wrapped in a sheet wrung out of tepid or cold water, and kept moistened by being swabbed with a sponge dipped into cold water, or even with a piece of ice.

The alternative arrangements which may be devised are almost endless. One can, for instance, tilt the bed, make the large mackintosh into a kind of bath by raising the edges, pour water over the patient, and drain it into a bucket at the foot.

A method frequently employed is the sponging of the body with water, either tepid or cold, exposing a limited region only at one time. In mild

cases of fever, and as a temporary measure, tepid sponging is very comforting and very beneficial. On the other hand, as an antipyretic, where cold sponging is usually recommended, there is no doubt that cold packs in the manner outlined above are more acceptable. During the process of cold sponging the patient appreciates every application of the sponge as a shock, whereas in 'packing' the temperature of the skin generally is more gradually and uniformly reduced.

In some cases, as already mentioned, the toxæmia may be too severe in its effects to permit any of the measures just cited. Frequently the body temperature under such circumstances, taken in the axilla or the groin, is already lower than the general symptoms would lead one to expect. The appearance of the skin or lips may, in conjunction with the examination of the heart and pulse, show a tendency to cardiac failure. There is evidently a deficient reaction to the intruding agent; the vital mechanism is almost overwhelmed in the contest, and the application of cold, in sufficient intensity to produce a further contraction of the peripheral vessels, may just turn the balance in the wrong direction. Under these circumstances the use of hot packs, mustard packs (in children mustard baths), hot bottle to the feet, and fomentations or stupes to the pre-

cordial region, together with the administration of a little warm stimulant or hot drink by the mouth, will frequently be followed by an immediate improvement in the appearance and general condition of the patient, the temperature rising to a degree which is more in consonance with the condition. With severe headache, or in children where convulsions are liable to supervene, it is advisable at the same time to apply cold to the head.

(*b*) Bed.

To particularize that in every acute illness the patient should be kept in bed, and that the bed should essentially consist of a hair mattress on a wire mattress, and not too wide to interfere with efficient nursing, may be deemed unnecessary, and yet it is nevertheless true that, much as the practitioner may pride himself that here is a duty which he steadily observes, instances of imprudence may still be noticed. It will be sufficient to mention two types of cases not infrequently met with. A working man suffers from a slight looseness of the bowels, feels out of sorts, and is a little feverish. His indisposition continues unabated for several days, even for one or two weeks, despite the use of drugs and instructions as to diet, etc. He is loath to go to bed. His family must be maintained. Finally the progress

of the disease suggests that it may be typhoid fever, and after having enormously increased the risk to himself and the community, he is compelled to take to his bed.

A child has 'growing' pains, or a mild attack of chorea, which does not seem sufficiently severe to compel confinement to bed. Some months or years later evidence of an old valvular lesion of the heart, or even of extensive pericardial adhesions, is detected.

The beneficial influence seen so markedly to follow from rigorous confinement to bed in the fever of acute pulmonary tuberculosis is not only an indication of the enormous importance of this stereotyped procedure, but from its comparatively recent adoption, and even yet frequent non-observance, evokes the surmise that the great value of absolute rest in any condition of general or local ill-health has not been sufficiently widely recognised.

As regards the nature of the bed and bedding, often no scope is offered for choice. The arrangements in better-class houses leave so frequently little to be desired, whilst amongst the poor the limitation in means forms an effectual barrier against innovations.

(*c*) Ventilation, Cleanliness, Warmth.

Concerning the conditions, however, under which the patient must live, and the air he must breathe, it is still only too evident that the practitioner does not always do all that he might. Even if he is unable to select for the use of his patient a room containing the requisite air space of 1,500 cubic feet, he can, at any rate, insure that by means of window, door, and open fireplace a satisfactorily constant interchange of air is taking place, and by a timely reminder of the necessity for cleanliness of the bedding and room generally can materially improve the condition of the atmosphere, and insist upon an absence of dust and dirt, at least during the illness of his patient.

There is still amongst many persons a tendency to keep the patients warm, and 'prevent them from catching cold' by heaping clothing over them. As a general rule, it is much better to have the patients lightly covered. They are then less restless. In some instances it may be an absolute necessity to use light clothing. In severe toxæmias, with high temperature, when the use of cold applications is judged to be dangerous, it may be that tepid sponging can be tolerated; but, on the other hand, the constantly increased heat loss which is obtained by the

lightest covering, is not a factor to be neglected. It may even be enhanced by lifting the bedclothes altogether from the patient by means of a cradle, and placing ice-pails in the space round the body. At the same time, if necessary, heat may be applied to the feet, and a fomentation to the precordial region.

The use of a thermometer recording the temperature of the room is too often neglected, and this omission is detrimental to the patient. A temperature of 60° F., which is suitable for most febrile conditions, can be maintained with a greater degree of steadiness when the artificial heating is controlled by frequent readings of the thermometer. Although 60° F. may be taken as a useful average temperature for pyrexial patients, in acute catarrhal conditions, such as measles, coryza, acute broncho-pneumonia, acute bronchitis, and acute laryngitis, a moist atmosphere of 65° F. is one of the most important factors in their treatment. There can be no doubt that the observance of these hygienic requirements accounts to a great extent for the difference in prognosis in such a disease as measles, the sequelæ depending practically upon the circumstances and intelligence of the parents, and their knowledge of the special risks and dangers. The slipshod manner in which these catarrhal diseases are often treated is

a disgrace to all concerned in their management. Such things as exposure to chill, prevalence of dust or dirt in the atmosphere, and want of careful confinement to the one equable temperature until recovery is complete, are so commonly met with, that one is forced to conclude that the average medical practitioner has not instructed the parents of the poor with sufficient clearness. It seems impossible to believe that, with an extension of the knowledge that during the acute stage a few days of rigid care may save life, or prevent years of chronic invalidism, more concern would not be shown. As a matter of fact, with a scrupulous observance of the hygienic requirements and no drugs, better results would be obtained than by laxity in the former respect and a careful consideration of the latter. In no other set of diseases is the adage truer that 'prevention is better than cure,' and more exemplified by the complications associated with them.

Even in better class patients a word of warning is necessary in dealing with some diseases. Knowing the value of warm, moist air, the bed or cot is not infrequently surrounded by a tent, without due regard being paid to the necessity for an adequate supply of fresh air.

(*d*) Feeding.

As a rule, in every acute illness the tongue becomes coated, the appetite disappears, and thirst becomes a prominent feature. The disinclination for solid food may be accepted as an indication that the digestive powers are not fitted to its proper assimilation. It may likewise be maintained that the presence of thirst represents a need of the economy, and that within reasonable limits such requirements must be adequately supplied.

Milk under these circumstances naturally forms the staple diet. Three to four pints in the twenty-four hours is, however, an ample supply. The routine methods of administration, such as peptonizing the milk, limiting it to small quantities given frequently and regularly, or to the use of whey under certain circumstances—*e.g.*, vomiting, diarrhœa, tympanites—are too well known to need recapitulation here.

Similarly, it is unnecessary to do more than mention such substitutes or adjuncts as broths or beef-tea* (free from fat), jellies, fruit-juices,

* It must not be forgotten that there are practically no food constituents in beef-tea. A substitute for beef-juice can, however, be obtained by flavouring a solution of egg-white with one of the meat extracts.

sugar (especially lactose), and the numerous prepared nitrogenous and carbohydrate foods. The individual preferences of the physician will assert themselves in his recommendations, whilst in cases of obstinate aversion to all food during convalescence, the culinary art of the attendants becomes taxed, and few things show the capabilities of a good nurse more than her readiness in devices to tempt her patient to take a sufficiency of suitable nourishment.

It must not be assumed that, because fever is present, therefore the patient is unable to digest solid food. It is true that, as a rule, in feverish conditions the various digestive secretions are apparently diminished, and that there is a disinclination, or even total loss of any desire, for solid food. On the other hand, it not infrequently happens that light articles of diet may be almost as perfectly absorbed in febrile as in non-febrile states.

It is, in fact, desirable to ascertain the patient's likes and dislikes. In healthy-minded people the very wish for an article of diet is a strong incentive to its administration, provided there is no contra-indication, and, in this respect, the physician should have good reason before forbidding the desired food.

In cases of coma or dysphagia due to paralysis

or inflammation in the region of the pharynx, and particularly in children where a persistent refusal to swallow anything is occasionally encountered, resort must be had to nasal feeding.

Nasal Feeding.

This simple device can be performed by any intelligent nurse after she has once received ocular demonstration, yet it is surprising how frequently its neglect retards the welfare or progress of the patient.

An indiarubber catheter of suitable size, a little glycerine, and the barrel of an ordinary glass syringe, are all that is required. The catheter being pushed with a twisting motion along either nostril for about 9 or 10 inches, a slight gurgling noise is audible in it, the patient meanwhile evidently breathing freely and quietly. If there be any doubt, a teaspoonful of water may be passed down; and should this not excite coughing, it is evident that the catheter is in its proper situation in the œsophagus, and that the requisite amount of nourishment can be forthwith poured into the stomach. In withdrawing the catheter it is advisable to pinch it between the fingers to prevent any of its contents dropping into the glottis during the process. Any form of fluid nourishment can be administered by its means, but in dealing with such substances as egg-flip, Benger's Food, etc., it is advisable to strain them previously through muslin to prevent blocking of the lumen of the catheter.

Details of Nasal Feeding.

1. Choose Jacques' soft rubber catheter, of size suitable to nasal passage of patient. Place a little glycerine

in a small dish or saucer, and take the barrel of an ordinary glass syringe.

2. The patient lying in bed, place a towel under the chin and over the clothing to catch any drippings.

3. Lubricate the catheter, which has previously been sterilized, with glycerine.

4. Push the catheter with a twisting motion along the nasal passage. If it does not pass readily on one side, try the other.

5. After inserting the catheter 3 inches, refrain from pushing it further, if retching occurs, till this has subsided.

6. If difficulty of breathing or cyanosis occurs, and does not quickly pass off, withdraw the catheter and subsequently reinsert.

7. Push the catheter onwards for 8 or 9 inches.

8. Examine the mouth to see the catheter is not deviated into it.

9. Place the end of the syringe in the lumen of the catheter.

10. Pour a teaspoonful of milk into the barrel of the syringe, and raise the latter to cause the fluid to flow down the catheter.

11. If it does not flow, force it onward gently by means of the piston.

12. Withdraw the catheter immediately if difficulty of breathing or cyanosis occurs at any time, and reinsert.

13. When the trial fluid has passed without inconvenience, pour in the nutrient fluid gradually, and allow it to flow till the desired quantity has been taken in.

14. On the completion of the process withdraw the catheter smartly and keep it nipped between the finger and thumb.

Except under special circumstances, which will be dealt with later, a complaint of hunger or a request for more or altered food may be accepted as an indication of the return of the digestive powers to a more normal condition. As Pawlow has recently demonstrated, there can be no doubt that 'good digestion waits on appetite,' and that a relish for any article of diet is an important aid in its digestion. It is our duty, therefore, as already indicated, to comply with these natural cravings to the best of our ability, rather than to counteract them.

Another question demands consideration in connection with the acute stage of the disease—viz., Should the patient be wakened to administer food? We may answer it by saying that nourishment should be applied regularly, and arranged for at times when the patient is expected to be awake. On the one hand, if insomnia be a prominent feature, it is manifestly inadvisable to curtail sleep; on the other hand, if the patient be usually drowsy, or even in a semi-comatose condition, the periods for the administration of food should be strictly adhered to. In other cases, however, it is preferable to make the instructions somewhat elastic, in order that the patient may obtain the greatest possible amount of rest.

From what has already been said, it is evident that the nursing of the sick person must be in capable and intelligent hands. In every case of the more severe forms of infection the services of a trained nurse should, if possible, be requisitioned. Much assistance, however, may be obtained if the practitioner is able to foresee probable occurrences, and give suitable instructions to combat them. Under these circumstances he will then frequently consider it sufficient to rely upon an observant, tactful, and common-sense member of the family whom he can trust to carry out his orders strictly.

(*e*) Drugs and Stimulants.

Speaking generally, it may be said that a careful observance of the hygienic requirements of the individual case, with the provision of satisfactory nursing arrangements, is of inestimably greater value than a reliance on drugs.

When dealing with acute diseases for which we possess a specific remedy—*e.g.*, antitoxin in diphtheria, salicyl compounds in acute rheumatism, etc.—it is evident that the specific remedy should be administered as early in the attack as possible, and in sufficient doses to put a stop to the disease or minimize its effects at the earliest possible moment.

In most cases, unfortunately, we are not in possession of such an antidote. The contest between the body metabolism and the invader must proceed till one or the other gains the upper hand, and all we can hope to do is to make the circumstances as favourable as possible for the former.

It is in viewing the matter in this light that one appreciates the value and the necessity of adopting any measures which maintain the general nutrition of the tissues. The importance of supplying nourishment in such forms and quantities as will admit of its ready assimilation; the obligation to insure complete rest in bed and a due proportion of sleep; the preference, further, for hydrotherapeutic measures, which, besides soothing and relieving the patient, so often aid powerfully in the elimination of toxins; the danger which attaches to the use of drugs of doubtful value for a specific purpose, especially if used in a quantity capable of diminishing the general recuperative forces, are too manifest to demand further consideration.

The use of some innocuous drug may be often advisable to satisfy the ideas of the patient's friends, or certain drugs may be called for in the treatment of definite symptoms or complications; but, so far as the direction of the course of the

disease is concerned, the practitioner will, in most cases, obtain more satisfactory results by relegating these to a subsidiary place, and by relying on the various forms of manipulative measures recently detailed.

Alcohol.

As regards the use of alcohol, it may be of value as an occasional and temporary cardiac stimulant, but even under such conditions it is questionable whether, in cases where a repetition is likely to be called for, its beneficial effect can be compared to the result obtained from a fomentation or stupe applied to the precordial region in some cases, or to the favourable effects of a hot or mustard pack in others. It is an unfortunate feature of the action of alcohol that its stimulative effect is apparently followed by a depressive action. Under its influence the tissue is not able to perform the same quantity of work, though it can put on a sudden spurt. The continuance of its use over any length of time is, therefore, manifestly contra-indicated. On the contrary, the use of fomentations and other forms of local applications appears to be followed, when judiciously used, by beneficial local and reflex effects, with the nature of which we are not even yet thoroughly cognisant.

Dr. R. Hutchison, in his work on 'Food and the Principles of Dietetics' (p. 481), summarizes the indications for the use of alcohol in fevers as follows:

'1. Failing circulation, as exhibited—(*a*) in a persistently rapid pulse (120 or more), or if it be weak, irregular, unequal, or dicrotic; (*b*) by a faint or inaudible first sound of the heart.

'2. Nervous exhaustion, as manifested by sleeplessness, low delirium, and tremor.

'3. Failure of digestive power, as indicated by inability to take food, diarrhœa, and dryness of the tongue.

'4. High temperature, especially if persistent.' (See, however, p. 3.)

'5. A bad general condition—*e.g.*, in feeble, exhausted, elderly, or alcoholic subjects.'

Dr. Hutchison is also of opinion that the form of alcohol used is not a matter of indifference. In the typhoid state he recommends such as contain volatile ethers—*e.g.*, good cognac brandy, sherry, and possibly Spanish brandy; in catarrhal conditions, effervescing wines; and in delirium, bottled stout.

It must, further, be remembered that 3 to 4 ounces of strong spirit—*e.g.*, whisky or brandy—an the twenty-four hours is quite as much as an adult can deal with satisfactorily, and that this

amount is too great to be continued for any length of time.

A corresponding reduction must be made for children, to whom, as a rule, it will probably be found more advisable to give sherry.

Drugs.

The treatment of the different symptoms and complications by means of drugs will be briefly referred to when considering the individual infections, but there is one prevalent practice deserving of special mention—viz., the use of purgatives.

It is a good routine rule to induce an evacuation of the bowels at the onset of any infectious disease, since, on the one hand, noxious contents and toxins may thus be eliminated. On the other hand, it is necessary to protest against a system of repeated purgation. Excluding gastro-intestinal infections, which require separate consideration, so long as the bowels act regularly—in most cases even every other day, considering the diet usually prescribed—it is probable that nothing is to be gained by periodically flushing the alimentary tract in the absence of any indications of disturbance in that system. With the exception of the pouring out of a watery secretion and its contained salts into the lumen, it is doubtful how far the bowel may serve as an

emunctory for the elimination of toxins. Its main function is evidently absorption, with disposal of unsuitable ingested matter. We know that in pathological conditions of various kinds the intestine may become the source of absorption of toxins, etc.; but such conditions, if not present, are more likely to be produced by the administration of an unsuitable diet. Where this latter is properly regulated, there is no reason to assume that the continuance of the febrile state will entail the formation of toxins in the intestine, or that the action of a purgative will rid the system of any considerable quantity of those toxins which are active in the production of the disease.

CHAPTER II

SPECIFIC INFECTIONS

1. INVASION OF THE BODY BY SEPTIC MICRO-ORGANISMS.

THERE can be no doubt that the contest with septic micro-organisms is a constant feature of our daily existence. Microbes of this character which gain an entrance by the mouth and are swallowed along with the food, if not taken up by the lymphatic tissue in the neighbourhood of the fauces, are probably, as a rule, sooner or later killed, or their growth is inhibited, by the gastro-intestinal secretions. Others, entering by the respiratory tract, if not entangled in the mucoid secretion of its lining membrane and extruded by the constant action of the cilia, are probably seized upon by wandering phagocytic cells, and prevented from further invading the tissues. The evidence of the regular invasion of the system by these micro-organisms is furnished by the readiness with which they manifest their presence when the

defences have been weakened. Diseases of this nature arise most frequently—excluding accidental inoculation—in weakly individuals, or in those who have been debilitated by disease. Under insanitary and bad hygienic conditions—*e.g.*, want of sunlight, overcrowding, insufficient ventilation, uncleanliness, etc.—not only is the defensive power of the individual reduced, but the number of opportunities for invasion is enormously increased. The importance of attention to these details and to the maintenance of the general health by good feeding cannot, therefore, be overestimated.

The invasion of the micro-organisms may be chiefly limited to one locality, the general symptoms arising from the absorption of toxins producing the condition known as sapræmia. Wherever such entrance is being effected, whether through the mouth in the form of ulcerations, or through the cavities of carious teeth, or from an abrasion of the surface of the skin, or, further, from their confinement in multitudinous situations —such as abscesses, inflammation in closed or partially closed spaces, as seen in empyemata, osteomyelitis, suppurative otitis, purulent affections of the nasal adnexa, septic conditions of the genito-urinary tract, etc.—the principle underlying treatment is evidently the free evacuation of any

collection, the provision of efficient drainage to prevent accumulation, and the maintenance of the absorptive surface in the cleanest possible condition.

In certain situations—*e.g.*, the mouth and throat and nose, and in the case of expectorated material from the lungs in bronchiectasis, etc.—it is important to give special instructions against the offending substances being swallowed, and, in a few cases, treatment must be actively adopted against the danger of urgent complications. The latter are more especially met with in affections of the throat and neck, the risk of asphyxiation from a retropharyngeal abscess, or from œdema glottidis, being by no means rare.

When the micro-organisms have, by means of the blood, been disseminated throughout the body —*i.e.*, in conditions of septicæmia—the same principles must be observed.

In one sub-variety of this form—viz., pyæmia, which is characterized by its dependence on microbes producing local collections of pus as the result of their dissemination, with the attendant symptoms often of recurrent rigors—the earliest possible evacuation of such collections is a most important part of treatment.

In other cases, however, dependent chiefly on streptococci and non-suppurative micro-organisms,

beyond the treatment, in the manner mentioned, of a possible original source of entrance, reliance must be placed on general measures.

In all cases where absorption is evidently taking place the necessity for rest must be strictly enforced. It is impossible to say at what period a serious complication, such as endocarditis, etc., may arise, and there can be no doubt that the defensive powers against the continued absorption of microbes and toxins from any locality, as well as the prevention of the supervention of further lesions, can be best maintained by a reservation of all the forces at our disposal for the common enemy. *Any unnecessary exertion is an added strain on the patient's recuperative powers.*

At the same time, the general condition must be well supported by abundant easily digestible food, an ample supply of fresh air, and good hygienic surroundings. In connection with this point, it is necessary to mention the importance of hydrotherapeutic measures.

The value of *local applications* of heat to further absorption or aid in seclusion is sufficiently well recognised; but in severer cases, though the value of occasional spongings or packs is acknowledged for the relief of restlessness and pyrexia, attention has not been drawn sufficiently to the benefits of their regular repetition with every exacerbation of

the temperature, whilst in cases of longer standing and of a more chronic nature the tonic effect of cold packs given regularly, or, in children, of tepid baths, is almost totally ignored.

The *hydrotherapeutic measures* which are of value in septic infections may be tabulated as follows :

1. *Sponging, Cold Packs, and Tepid or Cold Baths.*—These act as general antipyretics, and at the same time increase the elimination of toxins, maintain the tone of the vascular system, and check tissue degeneration. Their regular repetition seems to be specially valuable to the system as a whole in its contest with the micro-organisms.

2. *Cold Applications limited to Certain Localities.*—Sometimes it is deemed advisable to counteract the local inflammatory reaction, when ice-bags, evaporating spirit lotions, or lead lotions are used. An ice-bag to the precordium is sometimes of value as a cardiac sedative when endocarditis with rapid pulse occurs as a complication.

3. *Hot Applications* made *locally*—viz., fomentations, stupes, and poultices. These are frequently of the greatest benefit in aiding the pathological process taking place, by causing an increased flow of blood to the part. In addition, they act as counter-irritants, and are valuable for the relief of pain.

The treatment outlined above may be supported by the administration of such drugs as the preparations of iron, quinine, arsenic, sulphocarbolate of sodium, and strychnine. Within comparatively recent times the injection of antistreptococcic serum has been recommended in such cases as are presumably or demonstrably due to the action of streptococci. Unfortunately, investigations having shown that this class of micro-organisms is of a very composite nature, the remedy cannot be relied on as a specific one. Polyvalent sera containing the antitoxic principles obtained by injection of the toxins from the cultivation of streptococci from various sources have been prepared, and are worthy of a trial in selected cases. With a fall in the temperature or the pulse rate or a feeling of benefit on the part of the patient, the injections should be continued regularly so long as such improvement is observed.

The details to be observed in giving an injection of antistreptococcic serum are identical with those recounted for the administration of antidiphtheritic serum (see Section 15, p. 75).

The resulting action of the serums, however, cannot be accurately compared, since it is probable that the former is mainly bactericidal and the latter wholly antitoxic. The occurrence of sequelæ—viz., pyrexia, rashes, joint-pains—is met

with in both, being apparently independent of the active constituent of the serum, and related to its mode of preparation or to the animal from which such serum has been obtained.

The early administration of the remedy, as with antidiphtheritic serum, is particularly recommended. If its use is likely to be called for, it is manifestly advisable to inject it without delay.*

The serum is supplied in phials containing each 10 c.c., which constitutes one dose, and serves as a standard in the absence of the accurately measured composition of antitoxin units which forms the basis in anti-diphtheritic serum. The contents of one or more phials may be injected, according to the severity of the case, and the same amount repeated after twelve or twenty-four hours if there is evidence of benefit being derived. Possibly better results might be obtained by largely increasing the amount injected, as is done in scarlet fever. The uncertainty pertaining to its action in a given case, its expense, and the usual absence of dangerous complications in mild infections at all comparable to what is met with in diphtheria, all militate against the probabilities of its general adoption in such cases.

* Antistreptococcic and other serums can be obtained direct from Messrs. Burroughs, Wellcome and Co., or through the local chemists.

2. ERYSIPELAS.

This condition, thought by many investigators to be a variety of the septic type, presents such special features that it demands separate consideration. Limiting the use of the term to the clinical entity which is manifested by a definite onset, acute, spreading, and clearly-defined cellulo-cutaneous infiltration, marked by a raised margin which separates the inflamed from the healthy skin, and unaccompanied by suppuration, it is quite possible that such clearly-defined characters are the result of a specific micro-organism (*e.g.*, Fehleisen's streptococcus), and that the failure to separate it from the other streptococci is possibly owing to our present limited technique. Anti-streptococcic serum, which has been found of value in some cases, is unfortunately not a specific remedy in all cases, and unless obtained from the toxins elaborated by the specific streptococcus, could not, if the view just expressed is correct, be expected to furnish a real antidote. It is therefore important that a special 'erysipelas' anti-streptococcic serum be used.

The general measures directed to support the strength of the patient must be adopted, as in septicæmia, special reliance being placed on packs and baths, which may require to be energetically

pushed in cases of hyperpyrexia. Locally, since the disease spreads by a coccal infiltration of the lymphatic spaces beyond the inflamed edge, the injection of a solution of carbolic acid in different situations just in front of the advancing margin, or the cauterization of the skin by a caustic, have been recommended, but are now almost wholly discarded. With an extensive surface, and in certain situations (*e.g.*, face), these measures are evidently not feasible, and one must rely on such sedative applications as fomentations, dusting with pasma, smearing with boric vaseline, and covering, etc.

Hallopeau strongly advises the application of compresses wetted with 1 in 20 solution of sodium salicylate. They are to be covered with oiled silk and frequently renewed. At the same time, the salicylate is administered internally three times in the day, in doses of 20 grains each, unless symptoms of poisoning occur. Every alternate day the salicylate is replaced by sulphate of quinine, given in doses of 5 grains.

Dangerous complications, such as inflammatory infiltration of the tongue or œdema glottidis, must be immediately relieved by sucking ice, free scarification, or even tracheotomy.

The drugs most likely to be of use are preparations of iron and quinine, special importance being

usually attached to the administration of large and increasing doses of perchloride of iron.

Alcohol has been stated to be very beneficial in erysipelas and septicæmia.

It must not be forgotten that erysipelas is specially dangerous to some individuals, including the extremes of age, the feeble, those who suffer from chronic Bright's disease, diabetes, chronic alcoholism, and those who seem to have inherited or acquired an unusual predisposition. In the management of this disease a consideration of these points is of material importance in connection with the question of isolation (see Appendix I.).

3. RHEUMATIC FEVER.

Rheumatic fever is a specific infection apparently, supposed by some authorities to be due to the action of a diplococcus, and specially dangerous from the liability to the production of inflammatory changes in the different valves of the heart, and from the supervention of hyperpyrexia or other serious cerebral symptoms.

It is associated usually with evident pain and swelling of various joints, which require protection and warmth, or anodyne applications for their topical treatment ; and with profuse sweating,

which produces a feeling of chilliness, necessitating the use of woollen clothing next to the skin. The woollen clothing should be systematically changed as it becomes damp from perspiration, the body being meanwhile dried with warm towels and exposed as little as possible. On account of the perspiration also, the use of cold packs or cold baths is contra-indicated, except in grave cases of hyperpyrexia.

During the acute stages the diet should be restricted to milk and milk foods, the bowels being moved at the beginning by a laxative. As improvement takes place, light, nutritious foods may be supplied, such as stale bread, toast, cocoa, butter, jellies, and moulds made of semolina, ground rice, or arrowroot, in addition to the milk-puddings of rice, sago, or tapioca previously allowed. The return to an ordinary diet should be made gradually.

Large doses of sodium salicylate, or of the other salicyl compounds, according to the age of the patient, should be given regularly, the dose being immediately reduced when the temperature falls, or on the appearance of signs of salicylate poisoning (*e.g.*, deafness, tinnitus, delirium). Along with the salicylates, alkalies, such as sodium bicarbonate, the effervescing carbonates of potassium, and sodium should be freely administered, and

the patient should be allowed to drink moderate quantities of 'alkaline waters,' such as those of Vichy, etc., or even pure water.

The giving of the salicylates should be very gradually discontinued.

The necessity for confinement to bed during the pyrexial period is generally recognised, but the advisability of prolonged rest in bed on the supervention of endocarditis or of pericarditis does not receive the same consideration. Assuming that the infection has been overcome by the specific treatment, the means at our disposal for the management of the more severe complications are very limited. It is true that in the case of pericarditis some benefit may be obtained by blisters or other forms of counter-irritation, or that with endocarditis the rapidity and excitability of the heart may be materially diminished by the local application of ice-bags. The most valuable aid, however, is absolute rest in bed, with good feeding and careful attention to the hygienic surroundings, by which means the general nutrition of the body is maintained at the expenditure of the least possible amount of energy on the part of the circulatory apparatus. Confinement to bed is even to be strongly advised until we are reasonably sure that the acute changes in the valves have subsided, and until the cardiac muscle has

recovered from the effects of the toxæmia. It is at this time only that we can hope to limit the degree of the lesion, and for that purpose there can be no doubt that, after the subsidence of the acute infection, rest in bed offers the system the best chance of limiting the mischief already sustained.

A nutritious diet, protection from chills by the use of woollen underclothing, avoidance of damp, with care in the selection of bright, warm, dry, and well-ventilated rooms for living and sleeping in, will aid in preventing a recurrence, and these considerations should never be absent from the minds of those responsible for the care of children suffering from so-called 'growing pains.'

4. CHOREA.

Chorea, as met with so frequently in young children, and especially in girls, is in all probability the result of an infection, and on the supervention of endocarditis should be treated similarly by prolonged rest in bed. In addition, there can be no doubt that a certain constitution of the nervous system—with the nature of which we are not yet acquainted—plays an important part, and on this account also confinement to bed, with its consequent removal from all exciting surroundings, is

paramountly demanded. In the absence of any specific treatment—and neither arsenic, the salicylates, ergot, nor any of the drugs recommended for this disease can be looked upon as such—we are compelled to depend chiefly upon general measures, of which rest in bed, feeding, etc., have already been shown to be the most important. It is only by such means that the patient with chorea can be satisfactorily withdrawn from all forms of excitement and active interest. It is, indeed, regrettable to see the number of children who are allowed to drag on with what is apparently a mild attack of chorea, untreated because of their ability to perform their daily duties. Most frequently such cases finally exhibit symptoms of irremediable cardiac valvular affections.

5. MALIGNANT ENDOCARDITIS.

In malignant endocarditis the same considerations apply as in septicæmia, the former being essentially a septicæmia with a local lesion of the cardiac valves. Being liable to supervene upon various acute infections, the early and vigorous treatment of such infections is an important point in its prevention, and its occurrence does not demand any alteration of methods. Beyond the provision, if it be possible, of more absolute rest, the

administration of more nutritious and more easily digestible food, and a more careful consideration of the hygienic surroundings in which the patient is placed, no addition can be made to the principles underlying the treatment of septicæmic conditions.

6. PNEUMONIA.

It is a self-evident fact that in any affection of the lungs particular attention should be given to the air of the room in which the patient lies. The most suitable temperature is not the same for all diseases, but a liberal supply of fresh air, its freedom from dust or any form of impurity, and in grave cases the administration of oxygen gas in addition, are considerations common to all.

Further, the efficiency with which the lungs themselves can at all times perform their functions is so dependent on the condition of the heart that there is obvious need for its relief by the least possible call on its resources, and consequently for complete bodily rest. On this account light, highly nutritious, and easily digested fluid food is indicated. If, despite these efforts, there is evidence of cardiac dilatation or weakness, resort must be had, as in similar circumstances in other febrile conditions, to strychnine, caffeine, or even

injections of camphor (10 minims of a solution of 1 in 10 of almond or olive oil), the use of venesection in such cases being only a *dernier ressort*.

The necessity for rest also demands that particular attention should be given to insomnia, which is occasionally a troublesome complication. In the first place, cold applications to the head should be tried; but if these fail, then opium (especially Dover's powder, gr. x.) or chloral may be given during the first few days. Later, it is advisable to combine the chloral with digitalis, or to give paraldehyde.

Subcutaneous injections of $\frac{1}{100}$ gr. hyoscine are sometimes very effective, but in other instances they seem to increase the delirium and restlessness.

Under the term 'pneumonia' are comprised very different conditions, in which the further indications for treatment are not identical.

The most clearly defined form is that of *croupous pneumonia*, apparently a specific affection, the microbic agent in which, so far as we know at present, is the pneumococcus. Unfortunately, we are not in possession of a reliable specific serum, though antipneumococcic serum, in doses of 20 c.c., repeated some hours later, or of 40 c.c. at once, which has been stated to be

beneficial in some instances, may be tried in severe cases.*

The most suitable room temperature is 60° F. The patient should only be covered by light bedclothes.

Turning to the use of hydrotherapeutic measures, it has been stated that the assiduous use of ice-bags applied locally over the consolidated area of lung will even curtail the inflammatory process. Without advancing such a claim in their favour, even if the possibility of their value as antipyretics and reflex internal vaso-constrictors be admitted for robust adult individuals, it must be remembered that children and weakly or elderly patients cannot tolerate them.

Throughout the attack, until the crisis occurs, much benefit is experienced from repeated tepid sponging, and with hyperpyrexia stronger measures must be taken—*e.g.*, cold packs or baths. It is, however, very doubtful whether the marked general contraction of the cutaneous vessels, which occurs with the use of cold packs and baths, can

* Washbourn found that there are apparently various strains of pneumococci, and it may be that this accounts for the poor results, as regards curative effects, obtained from the use of antipneumococcic serum. On the other hand, it may be that the serums prepared have not contained a sufficient amount of antitoxin.

be always produced with impunity. Even excluding the increased work thrown upon the heart, and the consequent risk of cardiac failure, a congestion of internal organs, including the lungs, must take place as the result of the cooling of the skin, and where this is general and pronounced, it may not be devoid of danger. It is, therefore, advisable to delay their use until the temperature is distinctly hyperpyretic—*e.g.*, 106° F.

It should be mentioned that marked general cooling of the skin producing contraction of the whole of the cutaneous circulation is not universally held to be a source of danger. Osler, while admitting that we know nothing of the channels by which the toxins of the disease are got rid of, says we may assume them to be the skin, the kidneys, and the bowels, and, on this account, recommends tepid or cold baths.

At the annual meeting of the British Medical Association held in London in 1895, Professor Bäumler even described results in all respects comparable with the beneficial effects seen in typhoid fever. It is, nevertheless, doubtful whether, considering the shortness of the disease and the usual lack, apparently, of serious toxic changes in the tissues, even if we admit the possibility of the value of cold baths in some cases, the further embarrassment of the heart and

the circulation in the lungs does not constitute an effective contra-indication to their general and routine adoption.

It must be clearly understood that *localized* cold packs or ice-bags—*e.g.*, to the chest—are not to be included in the same category.

As a rule, the application of heat locally in the form of stupes fomentations, etc., is more acceptable to the patient, and this is particularly the case when there is a superadded pleurisy. Under these circumstances, more active depletion by cupping or leeches, followed by fomentations, may be tried.

Occasionally croupous pneumonia has been known to occur in an epidemic form, associated especially with insanitary and other local or general debilitating conditions—*e.g.*, poverty, previous illness, sudden atmospheric changes, etc. The indications for treatment are those already given, but special stress must be laid upon the greater mortality, increased risk of cardiac failure, and the consequent need for supporting treatment, with added care in the use of depletory measures.

Under the term 'broncho-pneumonia' are included a variety of conditions largely dependent on the previous state of the lungs, or the micro-organism acting as the causal factor. Some forms

may be said to be essentially of a bronchitic type, and associated with a more or less general catarrhal state of the respiratory mucous membrane—*e.g.*, after measles, pertussis, influenza, etc.; whereas at the other extreme the formation of localized pulmonary consolidations of greater or less size may predominate, unassociated with any general catarrhal condition, and even by physical examination indistinguishable from croupous pneumonia.

In the latter disease it may be said that expectorant drugs—*e.g.*, ammonium carbonate, squills, ipecacuanha, senega—are generally of little avail till late in the disease, when the inflammatory products are breaking down and the sputum is thick and tenacious. In broncho-pneumonia, however, these drugs are more likely to be of greater utility, and this is especially the case in those forms which are of the above-mentioned bronchitic type.

There, is, further, not only less need, but even increased danger, in the external use of cold in this latter class of affections. They should, as a rule, be treated upon the principles laid down when dealing with the 'catarrhal' affections.

7. EPIDEMIC CEREBRO-SPINAL MENINGITIS.

Epidemic cerebro-spinal meningitis is a disease apparently rare in this country, but deserving of notice from its occasional occurrence.

It may arise sporadically, and be indistinguishable from cerebro-spinal meningitis due to other micro-organisms. The evidence, however, seems to point to the fact that epidemics of the disease are always due to invasion by the *Diplococcus intracellularis meningitidis* (Weichselbaum).

Infection may occur through the air and mouth, or by discharge from the throat and nose; but, on account of its location in the central nervous system, the infectious character is probably only slight.

In the management, therefore, of these cases, though precautions must be taken against the possibilities of infection in the manner cited, particular attention must be devoted to the other factors.

Children and young people, individuals whose vitality has been reduced by poverty, previous illness, malnutrition, sudden atmospheric changes, alcoholism, etc., are especially prone to suffer from the disease in its severest form, and should be specially excluded from the risk of contact. Un-

hygienic surroundings — *e.g.*, overcrowding, deficient ventilation, uncleanliness, and want of sunlight, act as a two-edged sword by lowering resistance and by increasing the risk of infection.

On account of the absence of any specific remedy, we are again compelled to rely upon the various factors mentioned under the heading of general measures for maintaining the strength of the individual attacked, though certain symptoms require special management. In the first place, it is evident that any depletory measure is of very doubtful utility. The necessity for quietness must be met by the exclusion of any excess of light beyond the needs of nursing. The value of rest as an aid to recovery has been dealt with previously, but there is a tendency to forget that the argument applies to each individual tissue or organ. In dealing, therefore, with affections of the nervous system, the importance of rest, both mental and physical, as well as freedom from all external stimuli, cannot be overestimated. It is probably for this reason that sedatives, and especially opium and its derivatives, are particularly to be recommended in the treatment of this disease, and we can also thus account for the benefits derived from warm applications and warm baths.

Not only must the diet be nutritious and easily

digestible, but in comatose cases the patient must be fed by the nasal tube. In comatose and semi-comatose states, occurring in any disease, regular evacuation of the bladder and rectum must never be neglected. For the emptying of the bladder, if the catheter be necessary, stringent precautions against sepsis must be taken. It is not, however, sufficiently widely known that the act of defæcation, even during semicomatose or delirious states, is usually accompanied by micturition, and that the giving of an enema or a suppository will promote the flow of urine when the local application of fomentations, etc., has failed to excite it.

Recently the injection of antidiphtheritic serum has been recommended, apparently on insufficient grounds, and the same may be said of mercurial treatment. Lumbar puncture, though useful for diagnosis, is of doubtful therapeutic value.

In cases which tend to recovery iodide of potassium may aid in the absorption of the inflammatory exudation, whilst massage, electricity, and strychnia are indicated to overcome the paralytic and paretic conditions. The general health should be improved by change of scene, liberal diet, administration of iron, etc.

8. EPIDEMIC INFLUENZA.

Epidemic influenza is a disease resulting from invasion by Pfeiffer's bacillus. Sporadic cases and localized epidemics occur not unfrequently, but recent investigations tend to show that these occurrences are not always due to the bacillus mentioned. It is, indeed, difficult often under these circumstances to establish the differential diagnosis from a 'common cold.'

Extensive epidemics only arise periodically, and are then characterized by a high infectivity. Their very extent is an efficient barrier against any other isolation than can be conducted at home, but the extremely depressing effect of the toxæmia upon the heart and nervous system renders the disease specially dangerous to the aged and to those weakened by disease and malnutrition, etc.

Such persons should, therefore, be guarded from contact as much as possible, whilst the individual attacked must seek rest in bed as early as possible, and have the benefit of all those measures (including diet, ventilation, nursing, etc.) which have been shown to be requisite in maintaining the general condition during febrile attacks.

As a rule, cold applications for the relief of

localized pain or distress are less efficacious than fomentations. An ice-bag to the head may be of value in headache, but, with the exception of the possible supervention of grave hyperpyrexia threatening life, the use of cold packs is unnecessary and inadvisable.

Quinine may be given throughout the attack, and is often very valuable in the treatment of stubborn neuralgias. Alcohol should only be used on the occasions when it is indicated by the condition of the pulse. Caffeine and strychnine are preferable cardiac stimulants where a continued action is necessary. Antipyretic drugs (*e.g.*, phenacetin and antipyrin) give temporary ease to the headache or neuritic pains in various situations, but their depressing effects must not be lost sight of, and the perspiration frequently occasioned by their use must be prevented from causing ill effects by having woollen clothing next the skin. The latter should be dried with a warm towel and the clothing changed when the sweating has subsided. Opium, glyco-heroin, etc., are valuable if there is pleurisy, troublesome cough, or marked distress. Special symptoms (*e.g.*, vomiting, bronchitis, etc.) require appropriate medicinal treatment, whilst arsenic, iron, glycerophosphates, etc., with plenty of nutritious food, fresh air, and change of scene as soon as possible,

must form the basis of the treatment of the numerous sequelæ.

9. CORYZA.

Under this term are included many common conditions, the differentiation of which will require a more intimate knowledge of their bacteriology and chemical pathology.

Excluding those cases characterized by temporary pyrexia, pain in various situations, possibly sore throat, but unaccompanied or followed by catarrhal symptoms, there still remains a very definite class, which, from the definiteness of its clinical manifestations, its prevalence, and its consequences, is worthy of separate consideration. The symptoms of a 'common cold' or an 'old-fashioned influenza' are too well known to need recapitulation. Unfortunately, many have become so accustomed to expect its occurrence and repetition that they have been rendered somewhat careless as to its effects.

Peculiarities of diet—*e.g.*, an excess of carbohydrates—have been ascribed as a factor in its production. With regard to the class above mentioned, this may be possible, but in the catarrhal form we are now considering the evidence of infection is frequently so distinct that its

microbic nature cannot be doubted. Even changes in temperature or exposure to cold, though usually considered to be the essential agents, are of questionable influence, save as predisposing factors. Certainly the best method to prevent their occurrence is by the avoidance of warm, badly ventilated, overcrowded rooms and vehicles, and by the daily use of cold sponging, followed by brisk rubbing of the skin. Such treatment not only improves the general health, but possibly accustoms the system to the reflex effects of sudden changes of temperature, or at least limits their consequences.

In the treatment of coryza it is important to effect a cure as speedily and completely as possible, and for this purpose rest, warmth, non-exposure to changes of temperature, and, during the febrile state, confinement to bed, are the most powerful factors. When bronchitic signs appear, the temperature of the room should be maintained about the level of 63° to 65° F., and a moist condition produced by means of a steam-kettle. A free supply of fresh air and an avoidance of dust are also necessary.

In some instances the use of a menthol snuff has seemed to alleviate when used at the onset of the attack. Later, a mild antiseptic nasal spray is beneficial. Though the claim that by the use of opium the disease may be made to abort has not

been established, there is no doubt that as a sudorific, combined with hot drinks, warm blankets, and bed, not only is the patient's comfort materially increased, but the severity and extent of the attack evidently curtailed.

Cold applications, or even exposure to cold, are throughout contra-indicated. The predisposition to suffer from recurrent attacks of coryza is, apparently, very widely spread, and is only too frequently the cause of a chronic bronchitis. The importance, therefore, of permitting the inflamed mucous membrane to return to its normal condition as speedily as possible, and of guarding it from all forms of irritation—*e.g.*, dust, cold air, reflex congestion, etc., during its acutely inflamed state cannot be overestimated.

Since the advice of the practitioner in this disease is so frequently deemed to be unnecessary, it is very desirable that the people themselves should be more thoroughly acquainted with the principles of its management and the risks of neglect.

10. MEASLES.

Measles has already been mentioned more than once, as it is the typical example of what have been collectively described as catarrhal diseases

of the respiratory tract. All that has just been stated in reference to coryza is also applicable, and even demands more careful observance in measles. It is chiefly owing to neglect of those considerations that the mortality from the disease continues so high. Since it is extremely infectious from the time of the appearance of the earliest symptoms, several days before the characteristic rash, and since the predisposition to its contraction is almost universal, it is the exception for a child to be for many years in contact with its fellows before becoming the subject of an attack. As would naturally be expected, schools constitute the chief centres for its widespread dissemination. The disease is specially dangerous for very young infants or for weakly and rickety children, and this is consequently not only an objection to their collection in classes from various homes at an early age, but an illustration of the advisability of limiting, so far as possible, during the first four or five years of life, the number of persons with whom the child must come directly or indirectly in contact. By this latter means the dangers of contracting infectious diseases at an age when the child is not only more susceptible, but more liable to succumb to an attack, would be materially diminished.

The most serious and fatal complication of

measles is broncho-pneumonia, the prevention and management of which have already been dealt with.

Cases in which profound toxæmia and a tendency to cardiac failure occur are best treated by hot packs, stupes, or mustard applications to the precordial region and the lower extremities, or the administration of stimulants, such as alcohol, strychnine, and ammonia. It must not be forgotten that an attack of measles predisposes the system to infection by other micro-organisms—*e.g.*, to Loeffler's bacillus and the tubercle bacillus—and that the attacks of diphtheria and pulmonary tuberculosis thus produced are liable to be of more than usual severity. It is evident, then, that particular care should be observed in connection with the hygienic surroundings of the patient and those who undertake the duty of nursing. If exposure to diphtheria should occur, it is advisable to give a prophylactic injection of antitoxin.

Persons suffering from tubercle in any form must be rigidly excluded, and on recovery from the attack of measles and the subsidence of all signs of bronchitis, the patient should spend as much time as possible in the open air, a liberal diet being allowed to enable the system to rapidly attain the healthiest possible condition.

The symptomatic treatment of measles is more

than usually important. Cleanliness of the mouth, eyes, nose, and ears must be observed in all cases where a discharge is taking place from these situations or an unhealthy condition of the mucous membrane is present. The supervention of gangrenous stomatitis or of panophthalmitis, is by no means limited to weakly and debilitated children. Ample nourishment, plenty of fresh air, and careful local treatment are therefore advisable as preventives.

Regular and frequent cleansing of the mouth is called for in many infectious conditions. By this means not only may the various forms of stomatitis be prevented or cured, but the occurrence of such complications as broncho-pneumonia may be rendered less likely to supervene. It is a good rule to swab the mouth and gums with a weak antiseptic solution, sodium phenate solution, or 5 per cent. solution of resorcin. These are freely applied to the mouth and throat regularly each morning and after every meal, a little glycerine and borax being subsequently smeared over the tongue and gums. In more severe cases of fever —*e.g.*, typhoid, etc.—where the tongue becomes dry, greater benefit is obtained by smearing with vaseline flavoured with a little essence of roses.

For the nose, especially when a purulent discharge occurs, as in scarlet fever, etc., a stream of

mild antiseptic solution (5 per cent. solution of lysol, solution of permanganate of potash of a deep port-wine colour) is to be directed at regular intervals up one nostril. So long as the nasal passages are free the stream of fluid will mainly find its way out by the other nostril, the child raising the soft palate during crying or breathing through the mouth. If either passage be blocked, it is not advisable to force a passage by inserting the nozzle of the douche into the nostril of the side which is free. In all cases the force of gravity only should be used, the height of the syphon action not exceeding 1 to 2 feet. A fresh nozzle, retained for the use of the same child, and kept in the meantime in a disinfectant solution or boiled, should always be insisted on.

After cleaning the nose either by swabbing or syringing, the interior of each nasal passage should be smeared with vaseline, applied by cotton-wool on the end of a probe, or the following may be similarly used :

Ext. hydrastis liq.	30 min.
Acidi carbolici	5 „
Tinct. iodi	30 „
Glycerine	1 ounce

The eyes also must be regularly bathed so long as conjunctivitis is present. For this purpose warm boracic lotion is usually sufficient. If, how-

ever, there is marked congestion or purulent discharge a solution of perchloride of mercury (1 in 5,000 to 10,000) or of formalin (1 in 1,000 to 2,000) may be previously used, the eyes being protected from light if there is photophobia, and atropine instilled if there be marked chemosis or evidence of inflammation of the cornea or iris.

When otitis media supervenes it is rarely necessary to perforate the tympanic membrane. In many cases the appearance of wax at the meatus, or even of a purulent discharge, is the first indication. There may, however, be marked pain, which is usually quickly relieved by the instillation of a few drops of laudanum, and the application of hot fomentations over the pinna. Doubt has been thrown on the absorption of tincture of opium when dropped into the ear, and on its anodyne powers, and, in consequence, a 5 per cent. solution of cocaine has been recommended. In practice the former method has, at any rate, seemed to be efficacious.

As a prophylactic measure against the occurrence of purulent otitis media in some of the less severe cases of scarlet fever, the removal of any adenoid vegetations causing nasal obstruction has been recommended at the end of the first fortnight of the attack (Gordon, *Medical Chronicle*, September, 1905, p. 327).

When a discharge from the ear has occurred, the meatus must be regularly swabbed out with one of the following solutions: sodii bicarb., 5 grains to 1 ounce; boric acid, 5 grains to 1 ounce; salicylic acid, 2 grains to 1 ounce; or peroxide of hydrogen, 2 per cent. The meatus must then be carefully dried, and a powder, composed of boric acid alone or of boric acid (8 parts) with resorcin (1 part), insufflated.

Should the aural discharge still continue after three or four weeks of such treatment, an astringent solution—*e.g.*, zinc sulphate, 1 or 2 grains to the ounce—or a spirit lotion—*e.g.*, methylated spirit 2 drachms, carbolic acid 5 grains, water to 1 ounce—may be tried. If improvement in the condition is very slight or absent after two months' treatment, the question of operative interference must be considered.

Laryngitis is occasionally a very serious complication. It should be treated by a moist atmosphere, fomentations to the front of the neck, and repeated doses of antimony and ipecacuanha. In some cases stridor becomes so marked that tracheotomy is necessary. Unfortunately the results are not satisfactory, the patient only too frequently suffering from broncho-pneumonia after the operation. It is worthy of note that tracheotomy, which is called for during the stage of

invasion, apparently offers better chances of success than when called for later—viz., during the height of the catarrhal symptoms.

In treating measles medicinally a warning may be uttered against the use of too strong laxatives. There is a tendency to a coexistent catarrh of the intestinal mucous membrane, and though diarrhœa is usually only a serious symptom in severe attacks, it may in slight attacks become troublesome from the marked irritation produced by purgation.

II. RÖTHELN.

Rötheln, or German measles, is of minor importance as regards treatment. The disease is essentially of a mild character, practically always devoid of serious symptoms, and free from dangerous complications. Tuberculous adenitis has been stated to occur as a sequela, and bearing this in mind, it is evidently not only desirable to attend to the hygienic surroundings of the patient during the acute stage, but to take special care against the possibility of exposure to tuberculous infection during the attack and early convalescence.

12. PERTUSSIS (WHOOPING-COUGH).

It is unnecessary to recapitulate the principles of treatment for the group of catarrhal diseases of the respiratory tract, to which this affection can be most fittingly allotted. They have been previously dealt with under Measles, Coryza, etc.

It is, however, important to emphasize the close connection of these conditions, since, largely on account of the absence of such symptoms as conjunctivitis, rhinitis, and frequently even of bronchitis, as well as from the lengthened course of the disease, and a lack of evidence that the patient is suffering from some serious acute disease, negligence and carelessness in treatment probably here reaches its maximum.

The patient requires plenty of fresh air, and in the warm weather, provided that precautions are taken to prevent the infection of others, may not only with impunity, but with benefit, spend the greater part of the day out of doors. On the other hand, in cold and changeable weather, even with mild attacks, confinement to a spacious, light, well-ventilated room or to the house, so as to insure a freedom from chill or exposure, is advisable if we wish to guard against the occurrence of broncho-pneumonia or to mitigate the paroxysms of coughing.

In all cases confinement to a warm room must be insisted on so long as pyrexia exists, and if the paroxysmal attacks of coughing or the subsequent whooping are at all severe, a temperature of 65° F., with the continuous impregnation of the air by steam, must be insisted on (see Coryza). The evaporation of a little carbolic acid periodically in the room acts as a further sedative,* whilst in older children a 2 per cent. solution of salicylic acid or resorcin sprayed into the mouth during inspiration is of benefit. In this connection, however, it must not be forgotten that all forms of excitement may be the determining cause of a paroxysm of coughing. On this account, therefore, quietness in the sick-room is most important, and it is further necessary to protect the patient from every form of physical or mental irritation, including any manipulative measures not acceptable to him.

The suddenness with which the paroxysms of coughing come on, and their markedly spasmodic nature; the intense anxiety frequently exhibited

* This may be accomplished either by sprinkling a few crystals of carbolic acid over live coals held on a shovel in the room, or more continuously either by vapourizing the crystals slowly by means of a spirit-lamp, or by placing a quantity of 1 in 20 solution in the water of the bronchitis-kettle.

by the child; and the characteristic adduction of the intralaryngeal muscles during inspiration, are all evidences of a nervous excitement which may have serious consequences—*e.g.*, asphyxiation, pulmonary collapse or emphysema, convulsions, etc., which, if not relieved by the general measures just mentioned, must be combated by such sedatives as opium (1 or 2 grains of Dover's powder), chloral hydrate, or croton chloral (given in 1-grain doses every two, three, four, or six hours, according to age), bromide of potassium, tincture of belladonna, and antipyrin. Bromoform is a valuable antispasmodic, but on account of its high specific gravity care is required in dispensing, and the mixture must be well shaken each time before the dose is administered.

Bromoform	½ drachm
Tincture of senega	3½ drachms
Syrup of oranges	½ ounce
Water (added gradually and well shaken) up to	6 ounces

Dose: 2 teaspoonfuls to 1 tablespoonful.

A degree of pyrexia calling for antipyretic treatment is practically unknown, except in association with broncho-pneumonia, so that there is no need to caution against the use of cold applications. It is necessary, however, to utter a warning against

the use of ordinary baths during the spasmodic stage. The necessary ablutions must be performed as speedily as possible, warm water only being used, and a small portion of the body treated at one time, so as to minimize the exposure of the skin to changes of temperature.

Though the adductor laryngeal spasm is occasionally so intense as to produce, amongst other things, asphyxiation, coma, and convulsions, it almost always subsides without active intervention being made. On account of the associated catarrhal state of the respiratory mucous membrane, relief by tracheotomy is only resorted to as a *dernier ressort.* Success has been reported from intubation. If convulsions be followed by permanent paralysis, and there is evidence of cerebral hæmorrhage, the advisability of a removal of the blood by trephining may subsequently demand consideration.

The diet must be light and nutritious, but it is particularly recommended that 'foods which promote fermentation and acidity—such as potatoes, farinaceous puddings, jams, and fruit'—should be avoided (Eustace Smith). The liability to tuberculosis and diphtheria as sequelæ demands the same consideration as in measles.

As soon as the climatic conditions and the state, stage, or severity of the disease permit, the patient

should have a change of scene, get into the open air, and be liberally fed. In cases in which the spasm of the adductor laryngeal muscles persists unusually long, benefit may be obtained from the use of quinine and antipyrin (1 grain of each twice daily to a child one year old, a grain of each being added for every year of life up to five), or 10 grains of liquid extract of grindelia every four hours to an infant (Eustace Smith).

13. TONSILLITIS.

The occurrence of septic infections about the fauces and naso-pharynx is closely connected either with insanitary or unhygienic surroundings, uncleanliness of the mouth and teeth, or with the exuberant collections of lymphatic tissue.

The importance of an adequate supply of pure, fresh air and of the other hygienic requisites for the animal economy has been sufficiently dealt with. The deleterious effects of nasal obstruction or of any impediment to the free entrance of air into the lungs at all times, as well as the associated risks of otitis, rhinitis, etc., cannot be considered here. It must suffice to emphasize the necessity of the early removal of such conditions as enlarged tonsils or adenoids, and not less important to draw attention to the advisability of the child

living as much as possible in the open air—preferably at the seaside—in order to counteract any tendency to the repeated catarrhs which probably play a large part in the production of this condition.

It is a good routine rule to consider every sore-throat as infectious, and to take immediate precautions for the isolation of other children. In the case of simple acute or follicular tonsillitis, a preliminary laxative is given and the child placed on a fluid diet.

The mouth is regularly washed out, and the throat syringed with a mild antiseptic lotion (see Measles). Older patients may use a gargle.

During the acute stage chlorate of potash seems to be of value, but later preparations of iron and cod-liver oil are most valuable.

In acute suppurative tonsillitis early incision in the manner described by St. Clair Thompson (see *British Medical Journal*, 1905, i., page 645) must be performed.

14. SCARLET FEVER.

Scarlet fever is a disease exhibiting the greatest variety in the degree of toxæmia. Many mild cases require nothing beyond isolation, light diet, daily ablutions, and the avoidance of chill. On

the contrary, the toxæmia may be so severe that collapse and cardiac failure are immediately threatened, requiring the use of hot packs or mustard baths to the surface generally and fomentations or stupes locally. Some of these cases, having successfully passed through the primary stages, subsequently pursue an uneventful course. Recently good results have been described from the use of a polyvalent antistreptococcic serum. Moser's serum has apparently given the best results. Large doses of 100 to 200 c.c. are recommended, but it is apparently not procurable in this country.

Most commonly, however, there is marked pyrexia, accompanied by evident sore-throat, and followed by septic infection. In all these cases in which the pyrexia is excessive and persistent (103°F. or over), without tendency to cardiac failure, it must be combated by the regular use of cold packs or tepid baths until the fever has subsided; and in the severe cases where the fever of the primary toxæmia passes directly into the remittent fever of the superadded septic infection, they must be continued until the temperature has subsided, or until contra-indicated by the supervention of some complication—*e.g.*, pneumonia, pleurisy, nephritis.

At first sight it may seem paradoxical to recommend in the milder cases a careful avoidance of

chill, and in the severe septic cases the regular use of tepid baths even up to and during the time at which nephritis may occur. In this respect, however, without attempting to enter into the question in detail, the following points demand careful consideration:

1. In mild cases nephritis is practically the only complication to be dreaded.

2. In severe septic cases the patient may succumb to the septic infection.

3. Though we are not acquainted with the exact pathogenesis of scarlatinal nephritis, it is probable that septic infection of the kidneys may play an important part from the damage which the kidney sustains.

4. The regular use of relatively cold water to the surface may diminish this risk, as shown when treating of fever.

5. The etiology of a nephritis may also be at times connected with the condition of the skin, owing to the well-established reflex influence of the latter on the kidney. The value of hydrotherapy in maintaining the healthy state of the skin has been already referred to under Skin Hygiene, and we may thus explain, not only the importance of cool applications during a continued febrile condition, but of regular warm baths or spongings from an early period even in mild cases.

6. It is possible that want of acclimatization of the skin to a method of treatment at an early period may be responsible for some attacks of nephritis occurring when changes in baths, clothing, etc., are made during the third and fourth weeks of the disease.

The patient should be confined to bed until the temperature has been normal for a few days, and should not be allowed to leave his room for a further period of several days unless the weather is very mild and equable.

The necessity for fresh air throughout the illness, for efficient and regular cleansing of the mouth, throat, nose, and ears (see Measles), for prolonged confinement to bed on the supervention of such complications as endocarditis, is governed by rules which have already been dwelt upon.

The diet, which is at first limited to milk, does not require detailed consideration beyond the statement that it should be 'light' throughout the attack, avoiding an excess of protein constituents —though not limiting them to the detriment of the patient's general health—and eschewing meat extracts. In children nasal feeding may be sometimes required. When nephritis occurs, its treatment does not differ from that of acute nephritis under other circumstances, but special attention may be drawn to the value of giving a preliminary

laxative, to the use of hot drinks, and to venesection in case of any acute cardiac dilatation.

During the period of marked desquamation, when the skin is rough, dry, possibly cracked or eczematous, regular inunction with lanoline or vaseline after the bath or pack is not only very acceptable, but always beneficial.

15. DIPHTHERIA.

Diphtheria is a disease arising from infection by the Klebs-Loeffler bacillus. The symptoms met with are due mainly: (1) to the local action of the growth of the micro-organism—*e.g.*, laryngeal stridor, broncho-pneumonia; (2) the absorption of the toxins formed by such growth—*e.g.*, various paralytic or paretic conditions, nephritis, fatty degeneration of heart muscle, etc.; (3) a superadded septic infection—*e.g.*, suppurative adenitis, otitis, etc. The toxins are amongst the most deadly poisons known, the degeneration produced by them affecting especially important structures, like nerves, kidneys, and cardiac muscle.

Fortunately, we now possess a specific remedy, by means of which the toxæmia can be immediately arrested. The diphtheritic antitoxin is, however, unable to annul the degeneration already

produced by the toxins. It is, therefore, of paramount necessity that the disease should be detected in its earliest stages, and that a sufficient supply of antitoxin should be injected. In case of doubt, the practitioner should inject a suitable dose at once, unless from his experience he knows that, from the mildness of the attack, he may with impunity wait until either a further visit, or the result of a bacteriological examination confirms or refutes his diagnosis. It can be safely affirmed that he will never have cause to deeply regret having given an injection, whereas it must be equally true that there are few medical men in extensive general practice who have not had cause to mourn a delay.

In connection with the giving of an *injection of antitoxin*, the following points should always be borne in mind.

1. An all-glass syringe is most reliable, and most readily and completely sterilizable. It should be taken to pieces before placing in the sterilizer. When boiled just before use, it should be allowed to cool before drawing serum into it.

2. The needle should be a fine one, and should always have a wire along the lumen when not in use.

3. The skin over the site of injection must be

sterilized by washing with soap and water, and subsequently rubbing with turpentine or ether.

4. The site of injection should be chosen in a region where the subcutaneous tissue is lax, where important organs are not likely to be wounded if the patient suddenly jerks the body, and where the temporary tenderness produced by the injection will interfere least with rest. The submammary regions fulfil these conditions very well.

5. The upper and lower parts of the body and the limbs of children must be held firmly by attendants when the injection is being given.

6. The hands of the operator must be sterilized, the serum drawn into the syringe, the skin at the site of injection pinched up with the left hand, and the needle pushed smartly into the subcutaneous tissue. The required amount of antitoxin is then injected gradually.

7. When the needle is withdrawn, the site of the puncture is to be sealed by collodion, or covered with clean lint kept in position.

8. The syringe and needle should be washed out, first with cold water after use and then with an antiseptic solution.

The *sequelæ* which may follow an injection are:

1. Pyrexia. It rarely lasts more than two or three days, and needs no special treatment.

2. Rashes. These are multifarious, being either simple erythemata, or morbilliform, scarlatiniform, or urticarial eruptions. They are irregular in distribution, frequently most marked around the site of injection, where they may make their first appearance. Sometimes they are accompanied by troublesome itching.

3. Joint pains. The knees and ankles are most often affected, the pain being occasionally accompanied by slight effusion.

4. General pains are sometimes present with the joint pains, and, like them, subside, as a rule, in the course of a few days.

5. Albuminuria is rarely met with as a sequela, and in the few cases reported recovery was complete.

All the sequelæ are most commonly seen seven to ten days after an injection. There are no contra-indications to the use of antitoxin which may not be overridden by the necessity for its administration.

In a few instances it has been stated that antitoxin has caused death, but apparently in each case the constitution of the individual has been at fault—*e.g.*, status lymphaticus, enlarged thymus.

A few cases also of giddiness, convulsions, collapse, or syncope have been described, but they

are sufficiently rare to warrant us in ignoring their possible supervention when considering the necessity or otherwise of making an injection.

It is not a little difficult in few words to give a satisfactory idea of dosage. It may be said, however, that during the first day an injection of 2,000 to 4,000 units, according to the evidence of severity given by the local and general symptoms, will usually be sufficient, and that a postponement demands an increased number of units, not only from the increased absorption of toxins which has taken place, but from the more urgent necessity of cutting short the toxæmia before the resulting degeneration has reached a degree which may be incompatible with life. The dose must be regulated by the nature of the attack, and not by the age of the patient.

It must further be remembered that naso-pharyngeal affections are usually severe, that the extent of the membrane is difficult to gauge, and that lymphatic tissue is profuse in that region. Allowance must be made for these facts by giving an increased dose.

In cases of great urgency intravenous injection has been recommended. The results which have been obtained from this method have been most encouraging. Large doses, even up to 20,000 or 30,000 units, are advised. In adults with prominent

veins it may be possible to inject directly, but in children it is necessary to first expose the vein. The bend of the elbow is the site selected. The operation may be performed either under a general anæsthetic or with a local anæsthetic, according to the condition of the patient. A general anæsthetic is certainly preferable if the patient is a young child and the friends are at hand.

The median basilic or median cephalic vein having been exposed, a couple of ligatures are passed round it, and the lower one tightened sufficiently to stop the flow of blood along it. The vein is then incised slightly on one side, and the serum—previously warmed to about 100° F.—injected through a blunt-pointed needle, which has been inserted into the opening in the vein and fixed by the upper ligature. The ligatures may be subsequently withdrawn if not absorbable, and any bleeding stopped by pressure.

Care is necessary to insure that no air is injected. Recent investigations have, however, tended to show that the admission of a small amount of air into the venous circulation is less dangerous than has hitherto been believed.

In giving the large number of units here indicated it is advisable to use very potent serums (these are supplied by Burroughs, Wellcome and Co.; Parke, Davis and Co., etc.). It has

been suggested that with large injections there is risk of producing an anti-antitoxin in dangerous amount, or even that the antiseptic used as a preservative in the serum may under these circumstances give an added risk of cardiac failure. With the serums mentioned, however, these risks may be totally neglected.

Again, in laryngeal or intrapulmonary diphtheria time may be an important element from the danger of mechanical obstruction, so that even in the absence of severe symptoms of toxæmia a dose of, say, 8,000 to 10,000 units is advisable if obstruction is already present. It was more particularly for intrapulmonary attacks that intravenous injections were first suggested and so beneficially used.

In connection with the management of laryngeal stridor a rule can be formulated which may be of the greatest assistance to the practitioner. Without considering the question of the relative values of, or indications for, intubation and tracheotomy, a word of warning must be given against delaying the operation for relief too long. Even if the operator intends to be guided purely by the sense of touch in opening the trachea, the child may be spared much anxiety and exhaustion by operating as soon as it is evident that interference will be necessary; but where it is the intention to make

a careful dissection, the fact of being able to take plenty of time and the absence of enormous engorgement of the cervical veins may make all the difference between a successful and an unsuccessful result. The difficulty is to decide when an operation cannot be averted, and to assist in this decision it is important to recognise that, after the injection of antitoxin, the obstructive symptoms will probably still continue to slowly increase for about twenty-four hours, and that no amelioration is to be expected for at least thirty-six hours.

The throat and nose, when necessary, must be carefully cleansed with mild antiseptic lotions. It is futile to attempt the removal of exudation about the fauces or other situations by mechanical means; even the ablution of the mucous surfaces of the throat, nose, and mouth by means of douching or swabbing should be performed with the greatest care and tact, and no force used which is likely to exhaust the patient or lower the general condition.

In all cases the importance of confinement to bed and of free ventilation of the room from the earliest possible moment cannot be overestimated. The maintenance of rest for two to three weeks after the throat symptoms have disappeared materially diminishes the severity, extent, and

danger of the paralytic sequelæ, and should be observed even in the mildest cases.

Nephritis must be treated on the usual principles, but in these cases, as a rule, the more important indications for treatment concern the associated cardiac failure, vomiting, or anuria. The patient must be kept absolutely quiet, the head low, the foot of the bed raised, and the diminished arterial blood-pressure counteracted by 5-minim doses of 1 in 1,000 adrenalin solution. Its administration should be commenced early, preferably as a prophylactic, and the dose steadily increased. Paralysis must be treated by the injection of gradually increasing doses of strychnia, the effect of each addition being carefully watched. In cardiac paralysis it is advisable to add $\frac{1}{120}$ grain of sulphate of atropin, frequency depending on age and effect. Citrate of caffeine is also of value, and where tachycardia is present digitalis may be administered by the mouth or injected subcutaneously. In paralysis of the pharyngeal muscles nasal feeding must completely replace the administration of food by the mouth. In paralysis of the diaphragm the foot of the bed should be raised to obtain the aid of gravity, the position of the patient being periodically changed from one side to the other.

So long as there is evidence of alteration of the

rhythm or contractile power of the heart, or a change in the heart sounds, the greatest care is necessary in permitting movements, and all sudden exertions must be interdicted. During convalescence massage and electricity are of value in restoring the power and maintaining the condition of the muscles.

The importance of injecting a prophylactic dose of antitoxin into other members of a family exposed to the infection, more especially those of tender age, must never be lost sight of; in fact, such injections should be made as a routine practice. The dose of antitoxin for a prophylactic injection should contain about 500 units.

It is important to remember that the immunity obtained is of the passive type, and only of temporary duration. An attack of diphtheria may even occur seven or eight days after receiving a prophylactic dose, and in any case the immunity has probably totally disappeared by the end of three weeks.

A single injection is therefore valuable for young or susceptible patients preparatory to their removal from the neighbourhood of infection, or where the diphtheritic patient is to be isolated. In cases, however, in which the susceptible patient must from any cause remain in the neighbourhood of infection, the injection must be repeated at

least every three weeks, and a close observation made to detect any symptoms occurring within that period.

16. TETANUS.

Tetanus, like diphtheria, is essentially a toxæmia. The bacillus usually obtains entrance by some wound, but remains locally, the symptoms arising as the result of the action of absorbed toxins upon the nervous tissues. For this disease also we are in possession of a specific remedy, but unfortunately by the time the diagnosis can be effected the mischief is too far advanced, as a rule, to be relieved by it, even though injection be performed directly into the subdural space. It is doubtful whether injection even into the cerebral tissues offers any advantages over injection by lumbar puncture. Naturally, if there be any reason to suspect inoculation by the bacillus, an immediate injection of 10 to 20 c.c. of antitoxin is the proper course. This, however, is a rare occurrence. It is therefore necessary to pay particular attention to thorough disinfection of all wounds at the time of their occurrence, to the sterilization of all instruments before use, and to the careful avoidance of the possibility of contamination of sera, vaccines, etc., prepared from animals, since

the bacillus seems to find a not uncommon habitat in connection with stables and manured earth.

When symptoms of tetanus have arisen, the greatest quietness in the patient's surroundings is indicated, and this must be supported by the free use of sedatives (chloral, chloroform).* At the same time nutrition must be maintained by freely administering a fluid and easily digestible diet. So important is the maintenance of nutrition that in cases where feeding by the mouth is impossible or inadequate gastrostomy has been recommended.

17. ENTERIC FEVER.

Enteric fever is a disease which is most fittingly described amongst the intestinal infections, for though in some instances it practically takes the form of a pure septicæmia, and in others the brunt of the infection falls on different organs (*e.g.*, kidney, lungs, central nervous system), it is nevertheless true that in the enormous majority of cases the bacillus gains entrance by the mouth and the digestive tract, and produces manifest changes in that system. Preventive measures are thus to be

* The continued administration of chloroform has been stated to produce degenerative changes in the heart, kidney, and other organs.

directed against all forms of personal and domestic uncleanliness, or pollution of food and drink by direct or indirect means. Attention being devoted to discharges from the mucous membranes of the patient, and to the dejecta (not forgetting the urine), it is evident that the manipulations connected with the nursing of the patient, the handling of the bedclothes or utensils after use, the inefficient disinfection or disposal of the excretory products, the intervention of flies with their filthy habits, etc., all suggest numerous channels by which the infection may be transmitted from the sick to the healthy. It is impossible in a work of this description to consider these points in detail.

Turning next to the management of the actual attack of enteric fever, it is important to emphasize the necessity of confinement to bed from the onset of the symptoms. The observance of this rule naturally depends on the diagnostic powers of the practitioner. It is, no doubt, sufficiently widely known that failure to observe it exerts a disastrous influence on the prognosis. The disease, however, arises so insidiously in many cases that, unless the medical attendant insists on his patient remaining in bed in every case of ill-defined or inexplicable indisposition with pyrexia, and with or without diarrhœa, he can hardly fail, sooner or

later, to lay himself open to the charge of neglecting this important precaution.

The patient should always be placed in a light, well-ventilated, spacious room, and should have the services of capable and reliable nurses. It is impossible at the outset of an attack to forecast its duration, or even its severity, so that not only should treatment be begun early, but every assistance that can be obtained from attention to nursing, diet, or hygienic surroundings must be pressed into service.

During the acute stage of the disease a fluid diet consisting chiefly of milk (as much as 3 pints in the twenty-four hours), sugar, nutrose, yolk of egg should be administered.

The abdomen and stools should be examined daily. The examination of the former is necessary to detect any change—*e.g.*, tenderness, rigidity, altered character of respiration, as well as loss of liver dulness—which may indicate serious complications. The examination of the stools is necessary to insure that complete digestion of the food taken has occurred; in fact, in all diseases associated with diarrhœa or intestinal disturbance the fæces should be regularly examined (see acute enteritis, p. 101).

There is no contra-indication to the use of any fluid, nutritious food, such as meat essences,

jellies, meat extracts, and various forms of carbohydrates, provided the examination of the mouth, abdomen, and stools yields results which are in consonance with the patient's desires. The patient should be allowed to drink water freely.

During the management of enteric fever and intestinal infections generally it is important to adopt every available means to bring the alimentary tract into the healthiest condition possible. If, therefore, the contents are evidently irritative and associated with tympanites or diarrhœa, the greatest benefit may be obtained by a dose of calomel or castor oil, followed by abstention from all food, but with a liberal supply of water until marked improvement has occurred. Fluid foods may then be cautiously added, their effect on the patient's comfort and on the condition of the abdomen and stools being carefully noted.

Though it may be possible by intestinal disinfectants to limit in some degree the toxæmia arising from the bowels, there can be little doubt that, having by abstention, and, if necessary, by flushing, removed the noxious contents and allowed the catarrhal state of the mucous membrane to subside, the same object can, in most instances, be efficiently obtained by careful dieting and a limitation to readily absorbable fluid foods. No constant benefit can be observed from the use

of such intestinal disinfectants as β-naphthol, salol, liquor hydrarygri perchloridi; and though the regular administration of charcoal and liquid paraffin, in association with repeated doses of calomel or castor oil, may be beneficial during the early period of an attack, or occasionally in cases coming under observation when tympanites and diarrhœa are already well marked, they are rarely necessary even in such cases, and are quite uncalled for in cases carefully treated from the beginning. On the other hand, it must not be forgotten that milk, when swallowed in moderate quantities at a time in the pure state, may form large coagula of casein, which, in the altered state of the intestine, are not completely digested, and make their appearance in the stools as small yellowish or whitish masses (see Enteritis, p. 101).

When the attack is over, the resumption of an ordinary diet must be very gradually undertaken. Differences of opinion exist as to how many days' normal temperature should intervene between the end of the attack and the commencement of a solid diet. It is, however, necessary to study each case individually, to refrain from forcing any change of diet on the patient, and avoiding at all times foods which are difficult of digestion or which can be bolted in masses, to resume an ordinary diet by slow stages.

To combat the toxæmic effects nothing is so efficacious as the regular and repeated use of cold packs or baths. The earlier they are begun the better the result. It is true that Chantemesse has prepared and described an antitoxic serum* which, if given before the eighth day, may, he says, bring about an abortion of the disease in a few days when given in cases of ordinary severity. Nevertheless, there is no reliable serum readily procurable at the present time in this country.

Symptomatic Treatment. — The complications and sequelæ of enteric fever are very numerous, and call for various alterations in, or suitable additions to, the general measures already described.

For tympanites, ice-bags applied locally are of value. If diarrhœa persists despite careful dieting, intestinal astringents and sedatives may be necessary. If bronchitis is unrelieved by baths, stimulant expectorants must be given. If pneumonia supervenes, counter-irritation, alteration of position, and, in some cases, administration of oxygen, are required. The baths must be stopped on all occasions when pneumonia, intestinal hæmorrhage, or perforation ensue.

For weakness of the heart's action, manifested

* The serum is given subcutaneously in doses of 10 c.c., repeated if necessary.

by relative diminution of the first sound at the apex or by smallness of the pulse, digitalis, strophanthus, citrate of caffeine, or strychnia, may be administered by the mouth, or the last-mentioned alkaloid may be injected subcutaneously. In more severe cases the solution of camphor mentioned under pneumonia may be injected. It is, however, very rare for dilatation of the heart to occur with sufficient rapidity or at so early a stage of the disease as to be benefited by venesection.

For hæmorrhage from the bowels, opium, to check peristalsis and quieten the patient, with local applications of ice to the abdomen, and the withholding of cardiac or general stimulants, give the best results. It is even preferable for twenty-four hours to refrain from giving anything by the mouth, limiting one's self to moistening the tongue.

For intestinal perforation, early diagnosis, followed by laparotomy, gives the only chance of success.

Signs of laryngeal obstruction must be diligently sought for in severer cases with any evidence of implication of the larynx, and, when necessary, relief obtained by tracheotomy.

Attention must be paid to the skin, and, in conjunction with scrupulous cleanliness, pressure relieved by the use of a water-bed if indications of bed-sores arise.

Venous thrombosis or phlebitis is to be treated by raising the limb and keeping it quiet, covering it with cotton-wool, and applying a local anodyne —*e.g.*, belladonna and glycerine.

Distension of the bladder is a frequent complication, and, when present, the urine must be withdrawn by catheter, should the application of a turpentine stupe to the hypogastrium or the production of defæcation by means of a glycerine suppository fail to give relief.

In typhoidal bacilluria urotropin in doses of 7 grains three times daily quickly causes a disappearance of pus and micro-organisms from the urine.

On the termination of the illness the patient should not be allowed to leave his bed for at least a fortnight after the temperature has become normal, and though a relapse does not often arise after an interval of twelve days, the possibility of its occurrence is to be expected as late as three weeks from the end of the previous attack.

The evidence available tends to show that inoculation with typhoid vaccine is of considerable value as a prophylactic measure. The efficacy, however, of the ordinary methods of prevention adopted when dealing with a case of enteric fever, and the existence, as shown by Wright, of a negative phase of immunity after the injection of

the vaccine, are barriers against the general adoption of the latter, and limit its usefulness rather to nursing institutions for this disease or to armies in the field.

18. PARATYPHOID FEVER.

Paratyphoid infections, except by serum and blood examinations, are indistinguishable from milder cases of enteric fever. They present no special features for treatment beyond those which have already been included in the general principles underlying the management of the latter disease.

19. DYSENTERY.

Dysentery is a comprehensive term including a variety of conditions resulting from infection by different micro-organisms. The intestinal changes are chiefly limited to the cæcum and large intestine. They are accompanied in some cases by profuse diarrhœa only, in others also by the passage of mucus, pus, or blood.

Amœbic or tropical dysentery is not included in the definition.

The disease may arise by infection through the soil, water, food, or air ; but more important probably is its connection with conditions of

poverty, depression, and lowered vitality; with changes of temperature; and in some cases possibly with an abuse of alcohol. Impacted fæces even may be the initial cause of infection, and constitute an important indication for treatment.

The necessity for rest in bed and hygienic and dietetic management is essentially the same as already mentioned under typhoid fever. The disease, however, being practically limited to the large intestine, an alteration in the dietary is usually permissible. Thus meat (well masticated or finely chopped), well-boiled white fish, soft-boiled eggs, farinaceous foods, especially well-boiled rice, and fat in the form of butter or cocoa, can usually be taken with advantage in mild attacks. Cabbage, beets, root vegetables, or the seeds of berries, must, however, be rigorously excluded, though potatoes in the form of a purée are admissible in less acute cases.

While diarrhœa is present, it is well to remember that rice, farina, and red wine act as vegetable astringents. Later, if constipation supervene, the physiological laxatives such as honey, sugar, glucose, and stewed fruits, may be allowed.

It is evident that the basis underlying our choice of foods is the selection of those which are nutritious and readily absorbable and which leave little residue. In acute cases it will generally be

found that milk is the most universally applicable food.

Throughout the disease warm baths are of advantage, and the patients often experience relief from the applications of heat (bran-bags, poultices, stupes, fomentations) to the abdomen.

If diarrhœa continues, salicylate of bismuth, tannalbin, or a bolus of ipecacuanha powder (20 to 30 grains, repeated), may be tried. The latter remedy is said to be more efficacious in the early period of the disease, and, if it produces vomiting, should be preceded by a stupe to the epigastrium and a dose of opium. Opium may also be necessary if there is dysuria, tenesmus, or tormina. In certain cases the regular use of a saline purgative gives the best results.

Though large enemata of a mild antiseptic lotion may be of value in the early stage in any case, their use is naturally dangerous later in the disease if the ulcerative process has extended deeply.

It can hardly be doubted, as already stated, that under the term of 'dysentery,' which, as here understood, is practically synonymous with all forms of ulcerative colitis,* diseases of very

* It is customary to make the passage of mucus, pus, or blood in the stools the distinguishing characteristic for the diagnosis of dysentery.

various etiology must be included. On this account it is only to be expected that a stereotyped method of treatment will not be equally efficacious under all circumstances, and that the practitioner must be prepared to exhibit various forms of management as indications arise.

20. SUMMER DIARRHŒA.

During warm weather cases of acute enteritis, or acute entero-colitis, become unusually frequent, and though bacteriological investigations have shown recently that in a large percentage of these cases Shiga's bacillus has been present, it is far from proved that this disease is always, or even usually, an infection by this micro-organism. On the contrary, it is very possible that the chief or primary cause is the increased heat of the weather occurring during the summer months, which probably acts in non-infectious cases by producing functional disturbance either of the nervous system or of the digestion, and in infectious cases by rendering the intestinal conditions more favourable to the occurrence of various infections.

Cleanliness, fresh air, suitable clothing, avoidance of improper or excessive feeding, etc., are therefore probably most essential in its prevention, whilst in the treatment of the individual case

it is important to remember that even in apparently primary dyspeptic cases a condition of the bowel has been induced which may require a considerable period for its subsidence before a return to an ordinary diet can be made.

The disease is most fatal and most prevalent amongst very young children. Unless the little patient is too collapsed, it is advisable to give a preliminary dose of castor oil, and following this to use bismuth salts, alkalies, and intestinal astringents.

Warm saline enemata, injected by the force of gravity only, and run in very gradually to the fullest extent that the bowel will tolerate (viz., 10 or more ounces), are of great service when the diarrhœa continues. If vomiting is present, or indigestible or unsuitable food has been given shortly before, it may be advisable to wash out the stomach. At the same time all food is to be stopped, and an attempt made, by giving sweetened water alone (preferably lactose), to obtain an absorption of the water supplied, and to enable the bowel to return to its normal condition. So long as the stools are unhealthy in appearance, or there is evidence of an irritative state of the intestinal mucous membrane, any attempt at feeding will probably be futile.

In returning to the ordinary diet in infants, it

is usually best to resume the giving of milk very gradually, establishing in the first place some digestible prepared carbohydrate food as a basis, to which increasing quantities of sterilized milk are slowly added. For infants over twelve months old the following formula by Meig may be advised: Twenty grains of Russian gelatine or isinglass, representing a piece about 2 inches square, is soaked in cold water for a few minutes, and then boiled in ½ pint of water for fifteen minutes. A teaspoonful of arrowroot is made into a paste with cold water, more water added, whilst constant stirring is maintained, up to ½ pint, and the whole boiled for fifteen minutes. The two mixtures, when combined, are supplemented by the desired quantity of milk. Later cream may be added just before taking off the fire.

It is important to keep the patient warm in bed, in some cases even to administer warm baths, and to avoid for some time the use of nitrogenous foods (beef-juices), as these seem to be more liable to maintain the abnormal condition.

A large amount of attention has been recently devoted to this subject in America, and, on the basis of its causal relationship to Shiga's bacillus, the provision of a serum for use in cases of summer diarrhœa is under contemplation in some

districts. The serum is not, however, at present procurable in this country. It is apparently most serviceable in the most acute cases, especially those in which the stools contain blood and much mucus.

As *prophylactic measures* against the occurrence of summer diarrhœa, the following points should always be kept in mind:

1. The infant should never be weaned in hot weather.

2. If fed artificially, the milk should be boiled, and all food prepared freshly each time. Every utensil used for storing, holding, or manipulating the food must be scalded and kept clean.

3. All decomposable matter must be burnt.

4. There must be scrupulous cleanliness of the room and surroundings of the child, free ventilation, and no dust.

5. The cleanliness of the body and clothing of the child and the suitability of the latter to the climatic conditions must be carefully attended to.

21. ACUTE ENTERITIS.

Summer diarrhœa may be described as an acute infective enteritis, but the general term 'acute enteritis' cannot be limited to that condition. An acute enteritis may be produced by various

chemical irritants taken accidentally or contained in the food. Irritative poisons may even develop in food from contamination or defective preparation (see Ptomaine Poisoning, p. 106); and, further, food essentially wholesome may act as an irritant by being excessive in amount or unsuited to the digestive powers of the individual. It is, evident, then, that a complete study of this question should include a consideration of the cooking and preparation of food, of its proper subjection to such processes as mastication and insalivation, of the probable deficiency in any respect of the digestive juices and the presence of slight gastro-intestinal disturbances, and finally of the idiosyncrasies of the individual. The etiological factors being so numerous, a few general observations must suffice, and at the same time it is to be remembered that the remarks on summer diarrhœa and ptomaine poisoning are largely applicable here also.

But before proceeding with the management of these conditions, it is advisable to make a few general remarks in reference to the appearance of the stools, since an *examination of the fæces* frequently furnishes the clearest indications as to the localizations of the intestinal catarrh and the nature of the abnormal processes taking place in the digestive tract.

The stools may be of ordinary appearance and colour, but unusually soft from the presence of too much water, the contents of the large bowel being hurried forward before absorption of the water has taken place. They may also be soft from excess of fat, but it is important to remember that in infants fed on milk the fat may form white, dry-looking masses mixed with curds when the milk is improperly digested. In children more particularly the formation of large coagula may be diminished by the addition to the milk of one-fiftieth of its volume of a 25 per cent. solution of sodium citrate.

In cases of severe acute catarrhal enteritis (cholera infantum) the digestive fluids may be poured out in sufficient quantity, and hurried forward with such rapidity as to give rise to serous stools.

The colour of the stools is largely dependent on the food. Thus, they are light yellow on an exclusive milk diet, or with excess of starchy food. They may even have a greenish tinge, and give Gmelin's reaction from the presence of bile. The green stools of infants are the result of bacterial growth.

Abundant gas and acid fæces are evidences of fermentation from intestinal catarrh. The presence of particles of undigested but digestible food is a

sign of an affection of the small bowel, or in fevers of overfeeding.

Very offensive, but not putrid, stools, with a deficiency in bile, are met with in acute indigestion and acute enteritis, including typhoid fever.

Frequent small stools, often dark in colour, indicate an affection of the large bowel, as also ribbons or masses of mucus unmixed with the fæces.

Diet.—It has been shown that in healthy persons the albuminous substances contained in meat, eggs, and milk, the soluble carbohydrates represented by the sugars, and the fats, are readily and almost totally absorbed in the intestines. Bread, rice, peas, cabbage, etc., are less completely absorbed, and a much greater residue is left from coarse bread, potatoes, carrots, etc.

In disease of the intestine these conditions are altered, the absorption of soluble carbohydrates being hardly affected at all, provided fermentation does not occur, and the absorption of nitrogenous matter being but little altered. On the other hand, the power of dealing with fats and vegetables is often materially lessened.

If gastritis is present, the food should be restricted to small quantities of skimmed milk—peptonized, if necessary—to lukewarm infusions (tea, fennel, etc.) and bouillon. In some severe

cases of gastro-enteritis it is necessary to perform lavage of the stomach, and subsequently to abstain from giving anything, even lukewarm water, by the mouth for several days. The tongue alone is to be moistened at intervals in such cases. Should the diarrhœa cease, nutrient enemata may be necessary, and these may be composed of peptonized milk, or eggs, with the addition of a little common salt, of peptonized raw beef-juice, peptones—*e.g.*, somatose or nutrose—or of sugar.

Some recent experiments by Dr. F. D. Boyd and Miss J. Robertson, recorded in the *Scottish Medical and Surgical Journal* for March, 1906, have enlarged our knowledge of the value of rectal feeding, and the conclusions they have formed are deserving of consideration as the latest expression of opinion on the vexed question of nutrient enemata.

The experiments were made on patients suffering from gastric ulcer, and extended over a period of six days, nothing being given by the mouth during that time. They found that all the patients lost weight, the amounts varying from 3 to 11 pounds, the average total calorie absorption for each twenty-four hours representing only about 400 heat units. Even if the diminished number of units found to be necessary by Chittenden's experiments is accepted as a basis, it is

evident that the quantity of nutrition which can be absorbed by this method is lamentably deficient (viz., 400 to 600 calories, instead of 2,500), and that even in the most favourable circumstances it is a process of slow starvation.

It is interesting to note that of the albumin given not more than one-sixth was absorbed, of the fat about one-third, but of the sugar, given in the form of dextrose, about nine-tenths. It would seem from these experiments that the capacity for the absorption of nutriment by the rectum varies with the individual, and that there is a limit to the amount which can be absorbed, so that more frequent or more copious injections are not followed by corresponding benefits. As regards albumin, they found milk to give the best results, and in considering the slight power of absorption of this food element, they point out the danger to the patient which may arise from its fermentation or putrefaction, with the consequent absorption of toxic bodies. The administration of albumin and organized ferments (*e.g.*, pancreatin, pepsin) may thus be the reverse of beneficial.

As the result of investigation, the following is recommended as a suitable composition for an enema: The yolks of two eggs, 1 ounce of pure dextrose, $7\frac{1}{2}$ grains of common salt, and 10 ounces of sterilized and pancreatized milk. Such an

enema should be given not oftener than every six hours, and though the quantity of nutriment given represents about 1,200 calories in the twenty-four hours, it is probable that not more than 500 will be absorbed, an amount which it is evident would be equalled by giving 4 ounces of sugar by the mouth. The inability to absorb food by the rectum does not extend to plain water, which is apparently very readily absorbed by this means.

Enemata—Technique.—As regards the technique in giving enemata, the following points may be mentioned: (1) A funnel and tube should be used. It is important not to injure the mucous membrane of the rectum or to produce any irritation in that region, as may happen from the use of a nozzle attached to a tube or to a syringe. (2) They should be given at a temperature of 100° F. (3) They should be given very slowly. (4) Not more than 10 ounces should be given at one time. (5) They should not be repeated oftener than every six hours. (6) A cleansing injection should be given daily. (7) The patient should remain quiet for some time after the injection. (8) If not retained, a little opium may be given, previously mixed with starch mucilage.

When the tongue is clean and vomiting ceased, gruels, red wine, *stale* bread, or thin toast may be

added; and on the appetite returning, lean meat, fish, or lightly-boiled eggs are to be allowed.

Vegetables, fats, acids, and carbonated or iced drinks must, however, be withheld for some time.

Of *drugs*, the most valuable are the preparations of opium, the salts of bismuth, tannalbin, and the vegetable astringents—*e.g.*, catechu.

22. PTOMAINE POISONING.

It is very probable that many of the cases included under summer diarrhœa and acute enteritis owe their origin to direct food infection, and are in reality instances of the disease under consideration. Ptomaine poisoning might therefore be considered as an etiological factor in both diseases, and even as a sub-variety of acute enteritis. The term is, however, restricted to cases in which the acute symptoms arise directly and solely from the taking of infected food, such infection being usually by a member of a specific group of bacilli or their toxins. The term is not restricted, as it should be, to the ingestion of the latter.

Practically it is a matter of no moment, since in those instances in which such a definite microbic invasion occurs—viz., of Gaertner's bacillus and allied micro-organisms—the principles of treat-

ment are essentially identical with those already laid down for summer diarrhœa and acute enteritis. In other instances, however, especially those which follow speedily after the taking of the infected food, the symptoms are directly the result of a toxæmia, and the question of their immediate urgency is the important point for consideration. In these cases, in addition to vomiting and diarrhœa, which do not require special reconsideration, particular attention must be drawn to the danger of collapse and cardiac failure, which are to be treated on the principles already laid down.

23. SMALL-POX.

Small-pox is a disease occurring chiefly in an epidemic form, and is of greatest interest to the general practitioner as regards its diagnosis. Its extreme infectivity, the widespread tendency to its contraction at all ages and under even the best hygienic conditions, as well as the frequent gravity of the disease and its complications, make it an absolute necessity that it should in every instance be treated in a special institution.

The fact that the characteristic rash does not usually appear before the third day usually necessitates treatment at home during the first three or four days of illness.

The disease generally begins suddenly with marked pyrexia, headache, backache, general pains, possibly rigors and vomiting. These symptoms are, however, evanescent, and do not call for any variation in the treatment prescribed under similar conditions in other fevers—*e.g.*, laxatives, sponging, 'anti-neuralgic' remedies, and opium.

Hyperpyrexia is uncommon, but there are no contra-indications to the use of cold applications in any form.

In severe toxæmic cases with signs of purpura or of cardiac failure counter-irritation by heat may be employed, but treatment in these cases is practically always in vain.

The further management of the disease falls into special hands, but its principles may be said to be essentially identical with those for scarlet fever, and include abundant fresh air, liberal feeding, and careful nursing. The food must be fluid during the acute period, but on the termination of the disease it may be rapidly changed to one of a more substantial character.

The mouth, nose, and eyes must be regularly cleansed in the manner mentioned under measles.

The skin is markedly affected from the presence of the eruption. During the early period frequent tepid sponging is very acceptable, and so long as

the patient's condition will permit tepid and even cold baths are advisable. During pustulation great care and attention are required to absorb the purulent material discharged and to keep the skin reasonably clean. The tenderness and irritation produced may be of sufficient severity to demand the use of a water-bed, the application locally of warm fomentations, and the internal use of sedatives. It is a good routine rule to keep the face and hands covered with warm moist applications, protected by oiled silk or gutta-percha tissue. For the face boracic lotion may be used, but for the hands and other parts of the body, when rupture of the pustules is taking place, solutions of carbolic acid, lysol, cresol, etc., are to be preferred.

The hair of the scalp in all severe cases with profuse eruption should be shaved off. It is very doubtful whether any benefit is to be obtained from the use of red light. The evidence obtained in this country seems to point rather to the fact that, at any rate by the time a case is admitted into the institution, the subjection of the skin to red light is powerless to interfere with the usual course of events.

The appearance of a vesicle on the conjunctival surface must be very energetically treated by bathing with antiseptic lotions and repeated

fomentations. These cases not unfrequently proceed to panophthalmitis, and lead to destruction of the eye. Energetic treatment and early instillation of atropine are therefore demanded.

Bronchitis requires the use of ammonia, senega, and other stimulant expectorants. Laryngitis is to be treated by fomentations externally and steam inhalations. When signs of obstruction arise tracheotomy may become necessary.

Furunculosis and the formation of numerous abscesses is a frequent sequela of small-pox. The purulent collections should be incised as soon as detected.

When scabs are forming daily warm baths and inunction with vaseline are necessary.

As already inferred, the practitioner unconnected with a small-pox institution is not called upon to make a detailed study of the management of this disease in its further progress and its complications. There are, however, two points in connection with it which he should never neglect to see fulfilled:

1. In every instance in which any doubt exists in his mind in regard to the diagnosis he should without delay obtain further assistance.

2. After taking the usual preliminary precautions for isolation on the evidence that he is dealing with an acute infectious condition, he

must see to it that, on the declaration of the case being one of small-pox, all contacts or exposed persons, including himself, are efficiently vaccinated, if not already immune, preferably within three days, and in any case within five days, of the commencement of the illness.

24. VACCINIA.

Vaccinia is an infection in almost all cases voluntarily submitted to as a preventive against small-pox. Two things are required—(1) a pure and active lymph, and (2) its aseptic introduction into the system, with subsequent protection of the wound or inflamed surface. The preparation of the lymph, excluding arm-to-arm vaccination, which should only be done in members of the same family, is outside the province of the practitioner. The use of calf lymph is generally to be preferred. The preparations obtainable in this country seem to be pure and reliable. It should, however, be pointed out that in each tube supplied the opalescent part of the lymph is probably alone active. The inoculation is usually made on the upper arm over the insertion of the deltoid. The skin should be washed with soap and water, and subsequently rubbed with ether. The contents of the tube should be blown in

three or four separate pellicles upon the sterilized skin, each pellicle being at least ½ inch distant from its neighbours.

The arm being grasped by the left hand of the operator so as to slightly stretch the skin, the latter is scratched with a sterilized needle through the lymph until blood just shows itself on the surface.

After the lapse of a few minutes the site is covered by aseptic gauze or dressing. If a bandage be necessary to hold the dressing in position, it must be removed after a couple of days, when the wounds from the scarifications are healed. It is very essential that as inflammatory swelling takes place, the circulation of the part should not be interfered with, and no shields or other apparatus used which may mechanically produce rupture of the vesicle or local irritation. A clean covering and aseptic absorbent dressing, should rupture occur, are alone required.

Whilst preventing local impregnation with any other infectious material, it is also important to guard against re-inoculation of the lymph into any other region.

Complications.—Any fear of inoculating syphilis or tubercle is removed by selecting calf lymph. The use of glycerine in the preparation of the lymph also destroys any septic micro-organisms

contained in it, so that erysipelas or suppuration will be dependent upon the introduction of the corresponding micro-organisms, either at the time of, or subsequent to, the operation.

Tetanus might be due to a contaminated lymph, the bacillus of tetanus being most frequently met with in connection with stables for cattle. Gangrene may arise in debilitated, anæmic children. It is, therefore, advisable under these circumstances, save in the presence of an epidemic, to postpone the operation till the infant is in a more healthy condition.

In generalized skin eruptions, or in hæmophilic individuals, the operation should also not be performed save under urgent necessity, and the same rule should be observed in the presence of eczema, since the inoculation of an eczematous region by the lymph may be followed by serious and extensive inflammatory changes.

The inoculated part should not be subjected to more movement than is necessary throughout the period that the acute changes are taking place, and on the occurrence of marked inflammatory œdema it should be treated by more complete rest and sedative aseptic applications. It is unusual for the general symptoms to be of such severity as to necessitate confinement to bed.

25. VARICELLA

Varicella is usually a mild infection, devoid of serious complications, and requiring only isolation with cleanliness of the skin, and the local treatment of any sores which may form from the ruptured vesicles or pustules.

In a few cases the toxæmia is severe, and the patient must not only be confined to bed, but the pyrexia and restlessness must be relieved by sponging, the nutrition maintained by careful feeding, and the numerous vesicles and pustules protected by the use of a water-bed. It should be remembered that the disease may be fatal to very weakly children, and that more than the average precautions should be taken to prevent their infection. At the same time, in these cases the hygiene of the sick-room, the improvement in the nutrition of the patient, and the strictest attention to the sores, which may become large and even gangrenous, are of the greatest importance.

26. MUMPS OR INFECTIVE PAROTITIS

Mumps is a specific infection of the salivary glands. In many cases the disease is so mild that, beyond the provision of a light diet, with local application of heat to the enlarged and tender glands and isolation of the patient, no further treatment is necessary.

In other instances, however, confinement to bed and the usual measures for the relief of acute febrile conditions are necessary. In addition, the tongue may be foul, and from the impossibility of opening the mouth the necessary cleansing process is not only difficult to perform, but the patient is unable to swallow any but fluid foods. In some cases it may be necessary to resort to nasal feeding where dysphagia is extreme.

Vomiting must be treated by counter-irritation to the stomach, the administration of food in small quantities, and gastric sedatives. If unrelieved by these measures, an aperient draught of rhubarb and magnesia may be tried. Similarly albuminuria, cerebral symptoms, or other evidence of severe toxæmia, must be treated on the general principles indicated previously. Orchitis, which is the most common complication, requires suspension of the inflamed organ and warm applications, its greater liability to supervene after exertion on the part of the patient being a further reason for enforcing rest and quietness throughout, even in the mildest cases.

27. TYPHUS FEVER

Typhus fever is now a rare disease, but limited epidemics are still occasionally met with in poorer districts. Associated particularly with poverty,

uncleanliness, overcrowding, deficient ventilation, and similar unhygienic conditions, it is only likely to occur in the practice of medical men whose patients are drawn from such districts, but to them the possibility of its occurrence should always be present. The difficulties of diagnosis, with which they are most concerned, are only likely to be found in the milder cases.

The disease assumes all degrees of severity, but of no other infection can it be more truly said that it should be treated on the principles laid down when discussing the general management of infectious conditions. Lassitude is such a prominent early feature that the patient is not long in voluntarily seeking his bed. His helplessness demands special nursing, and its steady increase, along with the protracted nature of the ailment, requires the regular administration of nutritious fluid foods, and constant attention to his numerous wants. The importance of fresh air cannot be overestimated, not only on the patient's account, but to limit the infection from spreading to others. The active principle is apparently readily rendered comparatively inert by a free admixture of air. Provided the patient is able to withstand the climatic conditions, better results seem to be obtainable by approaching as near as possible to treatment in the open air.

The clothing should be light and the feet kept warm.

For hydrotherapeusis each patient must have careful individual consideration, remembering that cardiac weakness is a marked feature of the toxæmia. On this account severe general cold applications may give rise to pneumonia in advanced or graver cases. Cold applications to the head and neck are safer and relieve the headache.

Stimulants and counter-irritation in the form of hot applications are often of service. The cleansing of the mouth and ears, the treatment of bronchitis by expectorants, of bed-sores, of venous thrombosis, etc., and the withdrawal of urine in comatose cases, are the same as described for enteric fever.

As in small-pox, this disease, when diagnosed, is always treated in special institutions; but the difficulties of diagnosis, which largely arise from want of acquaintance with its varied features, have not unfrequently been the cause of its management, during a considerable period of the attack, falling on the general practitioner. Under these circumstances little harm will have happened if the general principles laid down have been duly observed.

APPENDIX I

ISOLATION

In dealing with infectious diseases, the question of isolation must always be kept prominently before the mind. It is, therefore, advisable to consider the factors which influence the action to be taken.

In the case of certain specified dangerous infectious diseases there is a legal compulsion on the part of the doctor attending, and of the parent or householder, to notify the occurrence of such disease to the sanitary authority of the district in which the patient is residing. Usually the duty falls upon the medical attendant. The diseases specified for notification include the following: small-pox, cholera, diphtheria and membranous croup, scarlet fever, erysipelas, puerperal fever, enteric or continued fever, and typhus. The list is not, however, a fixed quantity in all districts and at all times. Some sanitary authorities of their own option make the notification of measles and whooping-cough compulsory. Many during the existence of an epidemic of small-pox cause chicken-pox to be temporarily notifiable, whilst on the possible supervention of an unusual and dangerous infectious disease—*e.g.*, plague—such ailment is of necessity included.

The notification of any infectious disease to the sanitary authority usually throws the chief responsibility for isolation and disinfection upon that body; but this is not always the case, the medical attendant not unfrequently having also a very large share. It is important, therefore, that he should be fully cognisant of the objects and limitations of his action.

In the case of serious and unusual diseases—*e.g.*, cholera, plague, small-pox, typhus—there is no option on the part of the medical attendant. The inherent danger in these infections, either from their accustomed gravity or the difficulties of preventing their dissemination, coupled with their occurrence only at intervals in epidemic form, are all sufficient reasons for isolation in special institutions, and necessitate the careful supervision of the deputed representative of the sanitary authority, not only for the treatment of the individual case, but for its efficient limitation as far as possible to the person attacked.

On the other hand, in the case of measles, pertussis, scarlet fever, diphtheria, enteric fever, though notification is advisable and necessary, the question of isolation must, to a large extent, depend upon local circumstances.

In the first place, even if accommodation could be provided for all the detected cases which arise, there is probably no one who still possesses the Utopian idea that such diseases can be eradicated from large centres of population by removing such cases to special institutions. In the interests, therefore, of the public health, it is advisable that marked discrimination should be shown in the case of those patients selected for treatment at home and those which it is decided to remove.

In this connection the nature of the disease; the peculiarities of the infection; the number, ages, and liability to infection of other members of the family; the opportunities for, and probabilities of, transference; the risk of collecting large numbers of patients together who are suffering from the same infectious ailment, are frequently not sufficiently considered; and since the determination as to what form of isolation shall be adopted rests with the medical officer of health representing the sanitary authority, it is advisable that the practitioner, being more intimately acquainted with the local conditions, should at the same time be fully cognisant of the special dangers of infection, so that any action taken as the result of his advice cannot be an added risk to the public health.

It is evident that amongst the poor the possibility of isolating different members of a family is, as a rule, a practical impossibility. It is, therefore, advisable, in the interests of the public, the family, and the patient, that persons in small houses, with no nursing accommodation, should be removed to hospital when suffering from a dangerous infectious disease. It might even be said that the sanitary authority does not always serve its own interests by refusing to take, or make provision for, serious illness of an infectious nature occurring under wretched hygienic conditions, merely because such disease is not notifiable, as though the responsibility for rendering all the assistance in their power in the management of an affection depended on its being compulsorily notifiable.

There seems to be a tendency to regard the isolation hospital purely as a means of preventing the spread of a disease. If, however, such be its only function, then it has not merely failed to justify its existence, but there would be grave reason to doubt its continued necessity. The sanitary authority owes a duty to the individual as well as to the public, and by serving the interests of the former it would frequently further its own interest as the guardian of the public health.

On the other hand, in the case of scarlet fever, and even in diphtheria, where the patient attacked is an only child, where the risk of the disease spreading in the same house or of conveying infection to others is practically nil, and where the medical attendant, from his knowledge and experience, is sure that there will be no detriment to the individual from home treatment, then the usual severe requirements for isolation in the house might with advantage be relaxed; for, even though a certain element of risk be admitted, it must not be forgotten that there are great dangers in congregating children together, more especially with these diseases, from various homes in different parts of the town, whilst in times when such diseases are more than usually prevalent it may become impossible to receive more necessitous cases.

It is a common error, and one which it cannot be too

frequently known is occasionally followed by disastrous consequences, to assume that, *because* a patient is discharged from isolation or quarantine, *therefore* he is free from infection. Unfortunately in most infectious ailments we are not yet acquainted with the microbic agent, and even in the case of diphtheria, in which an examination can be so readily made, the test is by no means conclusive. It is, therefore, necessary to rely on certain arbitrary rules—*e.g.*, absence of congestion about the throat or nose, absolute freedom from any mucous or other discharges. Even after the most careful search, however, patients are still found to convey infection occasionally, so that close personal intercommunication with the susceptible individual should always be for some time interdicted, and associations only take place in the open air, after the mucous membranes under observation have had a further period in which to bring about their own 'disinfection.'

In connection with home quarantine, it is also necessary for the practitioner in every case to consider the special predispositions of other members of the family, and thus to be guided in his actions as regards the patient or those exposed. Particular reference may be made to measles and whooping-cough and their dangers to children under five or six years of age; to diphtheria and scarlet fever and their fatality amongst children of two, three, and four years of age; to enteric fever and its unremitting nursing requirements and its gravity amongst adults; and to erysipelas, which is so frequently a serious disease amongst the very young, the aged, the debilitated, those suffering from diabetes, Bright's disease, or chronic alcoholism, and those specially predisposed. On the latter point, it is important to remember that other diseases (*e.g.*, scarlet fever, measles) show the same tendency to affect certain individuals, and often members of the same family, in a similar degree—in one case mildly, in another very severely.

There is still another point in which discrimination should be shown in reference to the requirements of notification. At

the present moment it is too often the rule when the practitioner suspects that he is dealing with an infectious disease, and consequently feels compelled to notify the authorities, for action to be taken in the supposed interest of public health, without giving sufficient consideration to the patient concerned. In scarlet fever such action is not uncommonly fraught with disastrous consequences. Were provision to exist in connection with every isolation hospital for the efficient removal and separation of such patient without the possibility of the contraction of infection, our present method might be considered satisfactory. On the other hand, a definite statement of opinion being required from the practitioner, so long as any doubt exists it is at least incumbent on that practitioner and on the sanitary authority to consider the surroundings of such patient, and satisfy themselves that greater harm may not follow its removal than its detention at home.

Turning now to the non-notifiable diseases, it is evident that three considerations underlie our attitude in respect to them. It may be, in the first place, that the symptoms of the disease, or the complications which follow, are generally of so mild a character as not to constitute any danger to the public health, as seen in German measles, chicken-pox, and mumps. In the second place, it is possible that the disease is so extensive as to make isolation an impossibility—viz., coryza, influenza, tuberculosis. (From the chronic nature of the latter, other considerations pointing to the necessity for its notification may be advanced, but these do not concern us here.) Finally, the infection may be transmitted at a period before it is usually possible to make a definite diagnosis—*e.g.*, measles, pertussis. (In connection with the latter, attention must be drawn to the fact that the peculiar paroxysmal cough is a more reliable, because more constant, diagnostic sign than the characteristic whoop.)

In all of these affections responsibility for efficient quarantine, and for judgment as to the length of time it must be

maintained, falls more or less completely on the practitioner in attendance on the patient.

The tables on pp. 124, 125 will give an approximate idea of the quarantine necessary both for the patient and for an exposed susceptible person.

Isolation in the home cannot be considered *efficient* unless the patient occupies a room well removed from those occupied by other members of the family, and near which no susceptible person is compelled or is allowed to pass. In addition, those attending on the patient must not mix or live with the other susceptible persons during the period of infection, and must be responsible for the disinfection or destruction of all articles used or entering for use into the sick-room. If any article—*e.g.*, bedding—must be taken from the room, such must be thoroughly damped with water or placed in a disinfectant solution before removal.

From a practical point of view, if the infection is not considered dangerous, the risk may be rendered very small for the attendant upon the patient associating with others if a washable cap be used to cover the hair whilst in the sick-room, with a linen overall (both being periodically disinfected by boiling), and the face and hands washed before coming in contact with others.

Disease.	Duration of Infection.	Quarantine for Exposed Susceptible Person.	How Infection is transmitted.	Remarks.
SCARLET FEVER.	Very variable; average six to eight weeks. Must be quite free from discharges (either nose or ears), or sore throat, or moist wound.	Five to seven days.	By breath, by discharges from mouth, nose, throat, ears. By skin, bowels, or urine very doubtful.	Absence of inflammation or congestion of mucous membrane of nose, throat, and ears probably most important signs.
DIPHTHERIA.	Very variable; average two to three weeks. Must be free from all signs of rhinitis or congestion about throat, and bacteriological examination negative.	Seven days.	By breath, by discharges from mouth, nose, throat, ears, or wound.	After bacteriological examination, probably absence of inflammation or congestion of mucous membrane of nose, throat, and ears most important signs.
MEASLES.	Two or three weeks; probably gone by time all catarrhal and pulmonary changes have disappeared.	Fifteen days.	By breath, by discharges from nose, eyes, ears (?), lungs. By skin very doubtful.	Most infectious during first days after onset.
WHOOPING-COUGH	Six weeks to two months, till free from bronchitic signs and characteristic whoop.	Twenty-one days.	By breath and sputum.	Discharges, especially sputum, and breath most infectious.
CHICKEN-POX.	Till all scabs drop off; may be two or more weeks.	Twenty-one days.	By breath, from ruptured contents of vesicles (?).	Most infectious apparently during early period of attack; infection readily passes from one room to an adjoining one.

Disease.	Duration of Infection.	Quarantine for Exposed Susceptible Person.	How Infection is transmitted.	Remarks.
SMALL-POX.	A few days to many weeks; all scabs and vesicular or pustular contents must have disappeared.	Fifteen days.	By breath and discharges from mouth, eyes (?), ears (?), and skin. Urine and motions may become infected.	Most infectious apparently during pustular stage; infection can be carried long distances aerially.
GERMAN MEASLES.	Possibly two to three weeks.	Three weeks.	By breath.	Most infectious during first three or four days.
MUMPS.	Three weeks.	Three weeks.	By breath and discharge from mouth.	—
INFLUENZA AND CORYZA.	Ten to fourteen days.	Five days.	By breath and discharges from nose, eyes, lungs.	Most infectious during first three or four days, or while catarrhal symptoms present.
ENTERIC FEVER.	Throughout attack so long as diarrhœa. May continue for long time in urine.	Three weeks.	By stools and urine, sputum (?).	Most infectious after first week.
TYPHUS FEVER.	Two to three weeks.	Two weeks.	By breath.	Very infectious during acute attack in immediate neighbourhood of patient.

APPENDIX II

DISINFECTION

THE various infectious diseases show very marked differences in respect to their infectious properties. It is, therefore, necessary to know by what channels and in what way the microbic agent leaves the body (see tables, pp. 124, 125). In general, it may be said that particular attention should be devoted to all discharges of every description, and that such should be immediately burnt, or received into and covered by a disinfectant solution.

In addition, as the microbe is evidently very frequently transmitted by the medium of the atmosphere, it may of necessity settle upon any surface or object in the room, so that the disinfection of all the contents of the room requires careful consideration. At the same time, it must not be forgotten that it may be carried a variable distance by the currents of air, so that attempts should be made, by using a room with a fireplace on all occasions, to insure that, so far as the rest of the house is concerned, such currents shall as far as possible be into, and not out of, the sick-room. Moreover, free dilution with air not only seems to readily render the microbe inert in some diseases (*e.g.*, typhus), but even in others must diminish the probabilities of infection. A free entrance of air from the outside must therefore always be maintained.

In the different non-notifiable diseases, on the termination of the illness it is customary to disinfect the room, and those contents which cannot readily be otherwise treated, by free and lengthy exposure.

Turning now to the disinfecting agents in use (see list, p. 128),

it must, in the first place, be recognised that a variable time is always necessary before disinfection is accomplished by them. In boiling we may say that the maintenance of a temperature of 212° F. for five minutes is for practical purposes sufficient. On the other hand, when dealing with chemical disinfectants, the time taken depends not only on the substance used, but on the strength. Mercurial and formalin solutions act quickly, but as a rule it is advisable to allow fifteen to thirty minutes' contact before considering disinfection to be complete. Two other points must be observed: (1) intimate admixture of the disinfectant with the substance to be disinfected, and (2) in the case of liquids, the use of the disinfectant sufficiently concentrated to allow the resulting mixture to be of the desired strength.

In the *practical performance of disinfection* the following rules should be observed:

(1) Moisten the surface of every article before disturbing it.

(2) Keep every suitable article immersed in fluid till disinfected.

(3) Disinfect by boiling whenever possible—*e.g.*, bedding, crockery, feeding utensils.

(4) Burn useless or inexpensive articles which cannot be readily disinfected—*e.g.*, books, toys.

(5) Spray or wash the walls from above downwards.

(6) Avoid mercurial solutions in disinfecting metal objects; also, unless made acid, for stools; and unless the articles are subsequently washed before drying, for linen.

(7) Avoid the use of heat or boiling for all leather goods, furs, etc.

(8) Books, feathers, and delicate objects which will not tolerate the ordinary disinfectants, even if subjected to vapourized sulphur or formalin, should always be subsequently exposed for some time in the open air.

(9) If sulphur is burnt, the object to be disinfected should previously be moistened, and in the process of burning the sulphur special precautions must be taken against risk of fire.

List of Chemicals used as Disinfectants and their Usual Strengths.

Solution of Perchloride of Mercury	1 in 5,000.
Solution of Formalin	½ to 1 per cent. (can be readily used as spray).
Solution of Jeyes' Fluid or Izal or Cresol	1 drachm in 1 pint (about ·75 per cent.).
Solution of Lysol	½ ounce to 1 pint (suitable for liquids containing albumin).
Solution of Carbolic Acid	1 in 20.
Solution of Chinosol	1 in 1,000 (suitable for boots and leather goods).
Solution of Chloride of Lime	1 per cent. (1½ cunces of bleaching-powder to 1 gallon of water). N.B.—The bleaching-powder must be kept in a dry place, as the chlorine evaporates more quickly in a moist atmosphere.

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